COAL AGE

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IT is surprising how few coal companies have realized fixed standards of operation. Too little attention is paid to efficiency as a basis of working.

For example, let us assume that in one particular department of a concern, the actual power expenses are $10,000, and that a predetermined calculation indicates they should be but $5000. A power specialist must get busy and effect the change. Less coal and less power must be used for the same output.

If the present expense is $65 a year per horsepower of 3000 hours, every item of cost must be analyzed, and an expense based on standardized conditions must be ascertained. If it is proved the figure should not exceed $48, this standard cost should be set up for the superintendent of power production to aim at.

The foreman who is in charge of the work where power is consumed is not particularly concerned whether it is furnished him at $65 or $48, but it is his business to prevent wasteful use. It is here, then, that another expert must scrutinize items of power use, and determine what reduction can be made in the total annual consumption by the elimination of leaks, wastes and frictional losses, due to such things as lack of alinement and too tight belts. Right here a saving of at least 30 per cent. can be effected in nine out of ten coal-mine power plants today.

It is absolutely essential in perfecting such an efficiency system, to have the item of power, as to production, distribution and use, set up monthly in two parallel columns, one giving the actual, and the other standard results. The officials must then co-operate until facts and theory agree. Other items of expense, such as maintenance, should be treated in the same way, and can well be placed under the direct supervision of a staff specialist.

In the near future, when attention has turned from the task of reforming capital, to the no less important work of correcting labor, the more difficult act of standardizing coal-mine pay rolls will be accomplished. There will be standard time and cost for every task. As conditions change, standard times will be revised, so as always to conform to the highest personal efficiency of the worker. Co-operation of the employee in surpassing standard output will be secured by providing a wage incentive and by permitting *ambition and hope to have full play.* In addition, the workman will be impelled from behind by fear of discharge.

The mine official who doesn't make constant reference in a comparative way to carefully prepared statements of standard costs and daily wastes is surely running a race without a stop-watch, and on an unmeasured track. Only by the use of predetermined costs can we know that our methods are producing results.

If a mistake occurs in the wages of an employee, and he is over-paid, no time is lost in correcting the error. But how about the same man destroying material or killing time? We do not believe that attention to labor charges should be any less persistent or careful, but efficiency losses should receive closer supervision.

The necessary basis for an effective efficiency system includes the rule that "no material shall be issued without a complete requisition, nor shall any special work be permitted without a service order." Some officials object to full requisitions on the ground that they increase "clerical expense." This is not true, for tabulated information, built up from these requisitions, will cost less than an incomplete record secured along independent lines. A requisition is not a requisition when it calls for "as many lamps as the bearer wants," instead of specifying the precise number required to be given.

It is also possible to extend the use of service cards to machines, so as to compare the time and cost of different ones on the same work. The man in charge should not be satisfied if a runner operates one machine for five hours at 100 per cent. efficiency, and then handles another machine for three hours at a like high efficiency. The equipment boss should immediately concern himself with the fact that, *owing to idleness, the first machine only operated at 62½ per cent. efficiency, and the other machine at 37½ per cent.*, assuming an eight-hour day. It is in such cases that economies can and should be effected.

The Sheridan, Wyo., Coal Field

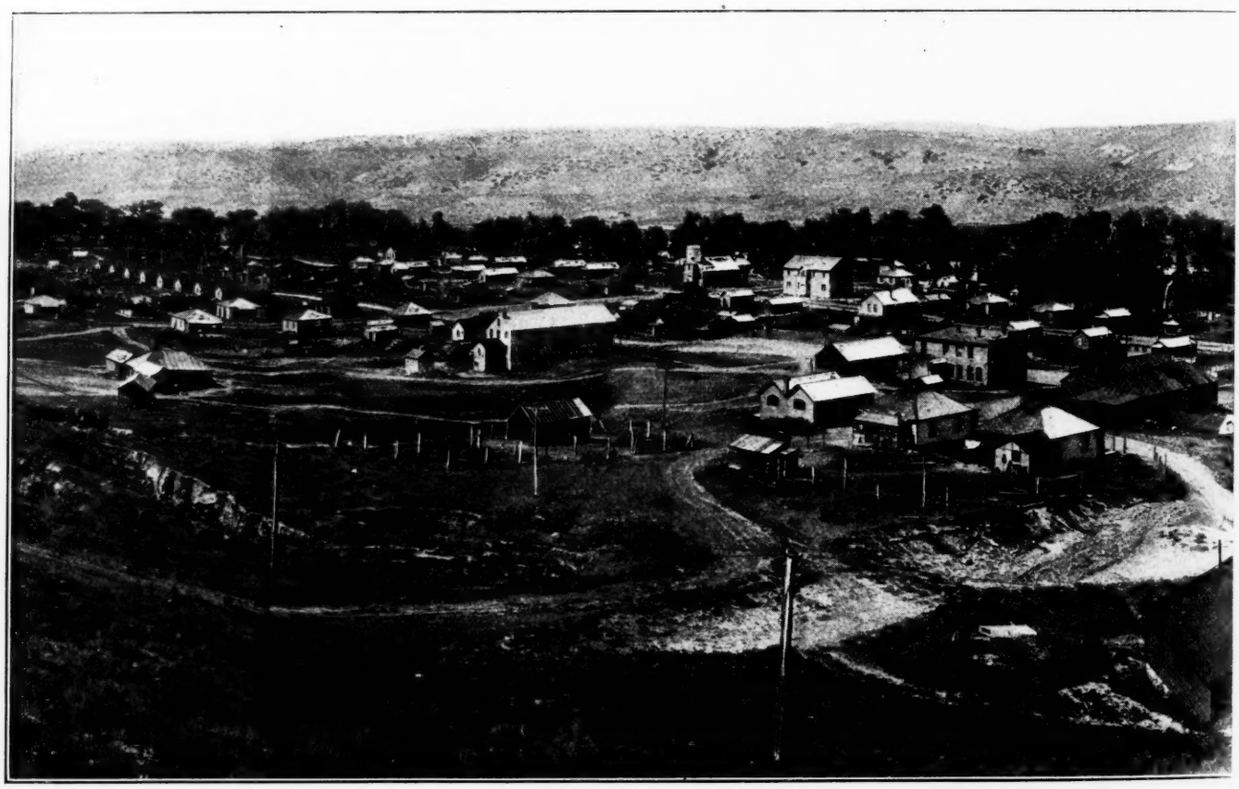
By Jesse Simmons*

A description of one of the largest producing fields in the West. The coal is classed as a sub-bituminous and there are numerous seams of more than ordinary thickness. The field is characterized by the modern equipment installed at the mines. This is the first of two articles on this district.

*Deadwood, S. D.

The Sheridan, Wyo., sub-bituminous coal field is one of the largest in the West. J. E. Stout, state mine inspector, in his report for 1909 says: "I believe it contains more tons of coal than any coal field in the United States west of the Mississippi River, so far as known at this time."

There are 13 seams of coal developed at various points in Sheridan County, three of which are the producers of more than nine-tenths of the tonnage of the district. Geologically, there are but two seams known to exist in the district in the lower horizons. That portion of the field within Sheridan County is about 36 miles east and west by nearly 20 miles north and south. In the adjoining state of Montana, along the Tongue River, these beds outcrop for at least 60 miles. From this it will be seen that Mr. Stout's deductions are no doubt well founded, as here is a vast area underlaid by excellent coal.



TOWNSITE AT MONARCH, WYO., A TYPICAL WESTERN COAL-MINING VILLAGE

GEOLOGY

According to Bulletin 341, U. S. G. S. the 13 coal beds aggregate 144 ft. of coal in seams ranging from 32 ft. down to 5 ft. in thickness. The principal seams worked, the Carney, Monarch and Dietz No. 2 have an average thickness of 14, 30 and 10 ft., respectively.

The main transcontinental line of the Chicago, Burlington & Quincy R.R. passing northwesterly through the center of the district, gives shipping facilities enabling the coal to find a market in Iowa, Nebraska, South Dakota, Colorado, Montana and even as far west as Idaho and Washington. During the year 1910 the mines of this district produced 1,263,657 tons of coal. According to *Mineral Resources* 1909 during the year 1908 the coal was marketed at the mines for an average of $1.52 and during 1909 $1.27, per ton.

The coal is classed as sub-bituminous, since it contains less moisture and ash than lignites and more than bituminous or semibituminous. It has a conchoidal fracture, differing from the bituminous coals, and a bright, black lustre which distinguishes it from lignite. It burns to a clean white ash, making very little clinker and almost no soot. It contains on the average only a trifle more than a trace of sulphur. These properties make it an ideal domestic coal, and although it is lower in heat units than the higher grade fuels, it is extensively used as a steam coal. For the successful consumption of this coal under boilers it is necessary to provide more grate surface and the grate bars must ordinarily be set closer together as the coal has a tendency to break into small pieces while burning. One slight disadvantage that the railroad has encountered in the use of this coal is in dealing with the sparks. This is largely overcome by using stacks with very fine screens. A great many locomotives are equipped with bell and diamond stacks similar to those used on old fashioned wood burners.

The three varieties of mines, drift, shaft and slope, are represented in the district. The seams are thick, as compared with the ordinary coal bed, and the absence of water and freedom from gas simplifies the mining. During the 20 years that the mines of this district have been in operation there has never been an explosion that resulted fatally. The problem of ventilation is reduced prac-

tically to supplying enough air to remove the powder smoke. The only danger which must be guarded against is that of fire. It has been found that the coal is liable to spontaneous combustion and to guard against the large damage which might result it is a usual rule in the district to work the mines by a panel system which enables the operator to close up any portion of the mine completely and effectively.

During the fiscal year ended Sept. 30, 1911, according to State Mine Inspector W. E. Jones, the mines of the district produced 1,744,593 tons of coal, employing 1771 men in the work.

Monarch Mine

One of the largest mines in the district is the Monarch, 10 miles north o Sheridan. It is the property of the Wyoming Coal Mining Co. This property includes drift openings on the Monarch seam and a shaft 85 ft. deep to the Carney seam. The former seam is 30 ft. in thickness and the latter 14 ft. The present workings are confined entirely to the Monarch bed, although the Carney is opened so that within a short time it would be possible to get it in shape for a large production. However, the company has an immense body of coal exposed in the upper seam so that it will probably be some years before the lower is touched. The measures dip to the southeast on a grade of about 2%. The mine and camp are in the Tongue River valley, the main entry being a drift into the coal in the bluffs on the southerly side of the stream.

Main and cross entries are driven 12 ft. wide in the clear to a height of 10 ft. from the bottom of the coal. The panel system is used, rooms being driven 22 ft. wide, 10 to 12 ft. high and 250 ft. long, leaving a 20-ft. pillar between rooms. In drawing the pillars some of the roof coal is recovered as the seam is ordinarily a clean merchantable grade of coal for 18 to 24 ft., and it is endeavored to secure about this thickness. Goodman electric chain-machines are used for undercutting the coal and electric locomotives for hauling, an illustration herewith showing a trip on the way to the tipple.

Monarch's Preparation.

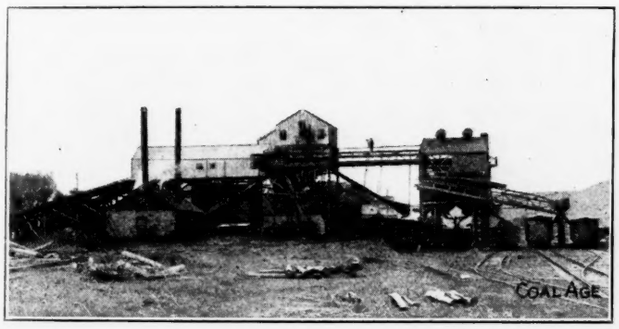
Monarch is quite proud of its preparation, and justly so. After the coal is weighed it is dumped into a conveyor and hoisted to the top of the tipple, dropping into a hopper which holds about 200 tons. This hopper has chutes leading into railroad cars on either side. Through these chutes can be loaded lump or mine-run on each side, or lump on one side and mine-run on the othe. Lump coal is screened over 5-in., diamond-bar shaker-screens, and all coal going through the bars is carried by a conveyor to two revolving-screens, where the different grades, egg, nut, pea and screenings or any mixture may be made. The meshes of these screens are first 2½-in., second 1-in., and third ⅜-in. All coal going over the 2½-in. is egg, everything through the 2½-in. and over the 1-in. is nut, everything through the 1-in. and over the ⅜-in. is pea, and everything through the ⅜-in. is screenings. A chute in the conveyor having 2½-in. bars make it possible to make a product known as "2½-in. slack."

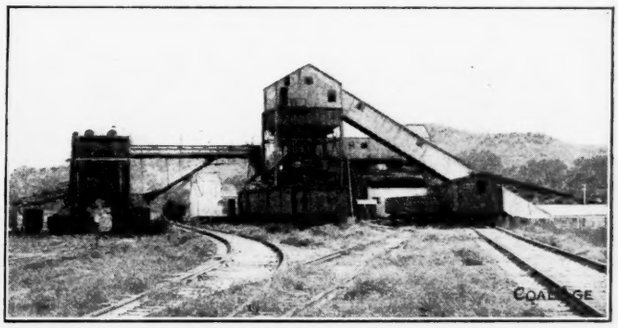
Trackage includes two tracks for loading egg, and one each for the nut, pea, screenings and 2½-in. slack, or eight all told, counting those for the main hopper. The object of the 200-ton hopper is two-fold. In the first place if there should be any delay at the mine it is aimed to have enough coal in the hopper to keep the tipple going until the mine trouble is remedied; on the other hand if there is any trouble at the tipple end, the hopper provides space for dumping coal pending the overcoming of this trouble. The tipple has a capacity of handling 3500 to 4000 tons in an 8-hour shift. The tipple and plant are driven by electricity secured from the Sheridan Electric Light & Power Company.

Monarch as the camp is known, is unquestionably a model coal miners' village. A stranger's first impression is that of a pretty country town, rather than a mining camp. The town, with a population of about a thousand people, has its own system of water-works, is lighted with an arc lamp on each corner and each miners' home has its fence enclosed yard, electric lights and running water. The company offers prizes for the best kept lawns and gardens. and this feature, together with the laudable ambition of its citizens, has made Monarch one of the neatest coal camps in the United States. It includes a modern brick church, a two-story school house, a new brick hospital, a union hall, etc. The officers of the Wyoming Coal Mining Co. are: Mrs. E. M. Holbrook, president and W. G. Birkhaeuser, vice-president and general manager.

Sheridan Coal Co.

The mines of the Sheridan Coal Co., located at Dietz, 5 miles north of Sheridan, are the oldest in the Sheridan field, having been opened in 1897. The earliest opening known is No. 1 Mine, and during 14 years of operation 220 acres of coal have been worked out. At the present time it is not being worked, as the coal is more readily accessible in Nos. 2, 4 and 5, and naturally can be mined much cheaper. These mines can be pushed to produce 5000 tons per day.





Views of Opposite Sides of the Monarch Tipple

The coal is mined on the block system, a method original with these mines, and which has proved to be a complete success. This system requires the expenditure of considerable money in order to develop a given area to the point of production, but, on the other hand, when once in operation it makes cheap mining possible. Another important advantage is the possibility of securing the workings against danger from fire, a menace that threatens occasionally in the mines of the district as has been noted.

Equipment.

The No. 2 mine is worked through a shaft 175 ft. deep, the coal being hoisted in self-dumping cages to the top of the tipple, by an Ottumwa hoist having two, 7-ft. drums and 24x36-in. cylinders. The power plant includes a 500-hp. Corliss engine belted to two, 200-kw. Goodman direct-current generators, rated at

275 volts, and giving 250 volts at the mine for driving Goodman haulage motors. The steam plant includes 3 Kewanee water-tube and 4 Murray boilers, the latter furnishing steam for the air compressor and hoist. A Norwalk air compressor furnishes power for the puncher machines.

Other surface equipment includes a machine shop, which is fully equipped. A feature of this shop is a 15-ft. lathe. A well supplied electrical repair shop is also maintained, where motors are rewound, and other small repairs made to the electrical equipment. Ventilation is accomplished by a 20-ft. fan, having 5-ft. blades, driven at 75 r.p.m. It is direct connected to a steam engine.

The seam, which is known as No. 2, averages 10 ft. 6 in. in thickness, of which 2 ft. of roof-coal is not mined. The coal is undercut by Harrison punchers. Rooms are driven 275 ft. and are on 45-ft. centers, the rooms themselves having a width of about 22 ft., thus leaving a pillar approximately the same width.

The No. 4 Mine

The No. 4 Mine is also working on No. 2 seam. It is a slope mine, the slope extending 300 ft. at an angle of 20°. From the end of this slope the workings extend horizontally out into the coal. The coal is hoisted out in 6-car trips by an Ottumwa single-drum hoist having 24x44-in. cylinders; the drum has a diameter of 5 ft., and 1¼-in. cable is used. The boiler room contains one Murray and two Wilson boilers, which furnish steam for the hoist and fan. Electric energy and compressed air for this mine is secured from the plant at No. 2, a quarter of a mile distant.

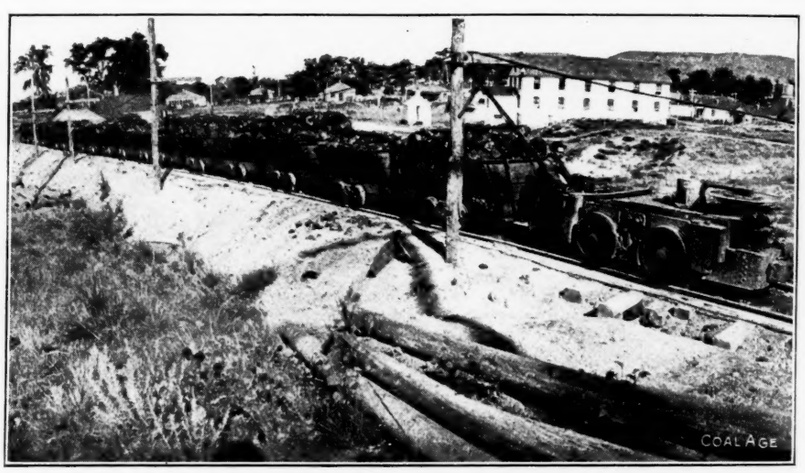
One of the features of this mine is the tipple, which is completely equipped for making the various grades produced in the Sheridan field. The mine cars are dumped on a well-planned dump, evolved and manufactured at the mine, and named the "Sheridan dump," or are carried farther to a Phillips crossover dump. The Sheridan dump is used for dumping into a hopper from which the mine-run is drawn, while the Phillips dump is used when it is desired to prepare other grades. Perforated shaker screens are in use in this tipple.

The Sheridan Coal Co. owns 6000 acres of coal land and in addition the coal rights of 800 acres. On this land there are known to exist 5 workable seams, the deepest of which, the Monarch, is 842 ft. below the surface. There are also two seams not classed as workable coal. The drill hole disclosing this coal showed the thickness of the various seams, beginning at the bottom: 22 ft. 6 in., 15 ft. 8 in., 9 ft., 8 ft. 6 in. and 8 ft., a total of 63 ft. 2 in., of workable coal, besides two seams, not workable, of 5 ft. and 4 ft. 8 in. respectively.

The officers of the company are G. W. Megath, president; W. B. McCormick, vice-president, both of Omaha, Neb., H. S. Hopka, Sheridan, Wyo., general manager and Louis Cake, superintendent.

Following is an analysis of the coal, which, by the way, is typical of the product of the Sheridan field:

Moisture	19.63
Volatile matter	35.08
Fixed carbon	39.87
Ash	5.42
Sulphur, Trace	
	100.00
B.t.u.	10,047



Electric Haulage System at the Monarch Mine

Explosion at Sans Bois Mine No. 2

By W. H. Fursman*

More or less dangerous conditions have prevailed in this mine since it was opened in 1902. The practice of driving low crosscuts probably had much to do with the explosion. Board brattices were used. A week prior to the accident, the mine and fan had been shut down for seven days, during which time gas was allowed to accumulate.

*Dewar, Okla.

About nine o'clock, Wednesday morning, Mar. 20, 74 miners lost their lives as a result of a gas explosion at the Sans Bois Coal Company's Mine No. 2, McCurtain, Oklahoma. Chant No. 2, as the ill fated working is known locally, is a slope mine. The seam pitches about 12 deg. and averages 7 ft. in thickness. There is a dirty band in the middle of the seam, about 24 in. thick, so that in reality there is but 5 ft. of coal. The coal is shot from the solid with Monobel. It has been the custom in driving crosscuts between rooms not to shoot down the top coal. This practice in all probability had much to do with the explosion which occurred Mar. 20.

Previous Explosions

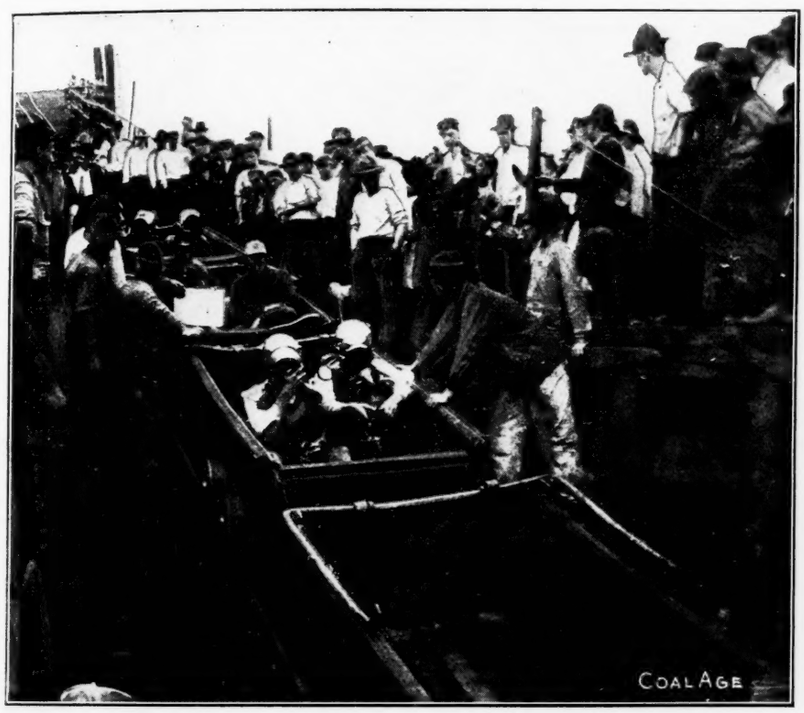
In order to convey some idea of the dangerous conditions which have always existed in these workings, the following list is given of the explosions which have occurred here since the opening of the mine in 1902:

Dust explosion, killing two shot firers	1903
Gas explosion, killing one fireboss	1904
"Windy shot," killing two shot firers	1905
"Windy shot," killing one shot firer	1906
"Windy shot," killing one shot firer	1909

The first day on which work was resumed following the last mentioned explosion, a second shot firer was killed, making two explosions during the year 1909, each of which killed one shot firer. The significant point about this list of disasters is the fact that in the case of all the explosions, the men mentioned above as being killed were the only ones in the mine at the time. Had any one of these explosions occurred during the day time when the mine was filled with its usual working force, the result would have been similar to that of Mar. 20.

When the slope was first opened, the brattices were built of brick or concrete, but of late years this practice has been discontinued and board brattices built instead. As is the case with nearly all board

stoppings, the vibration from the shots soon caused them to leak, impairing the ventilation. Such was the condition last fall when the state mine inspector closed the mine for 16 days until proper ventilation was restored. The mine is equipped with an 8-ft. diam. Capell fan, which



HELMET MEN ENTERING MINE AFTER SANS BOIS EXPLOSION

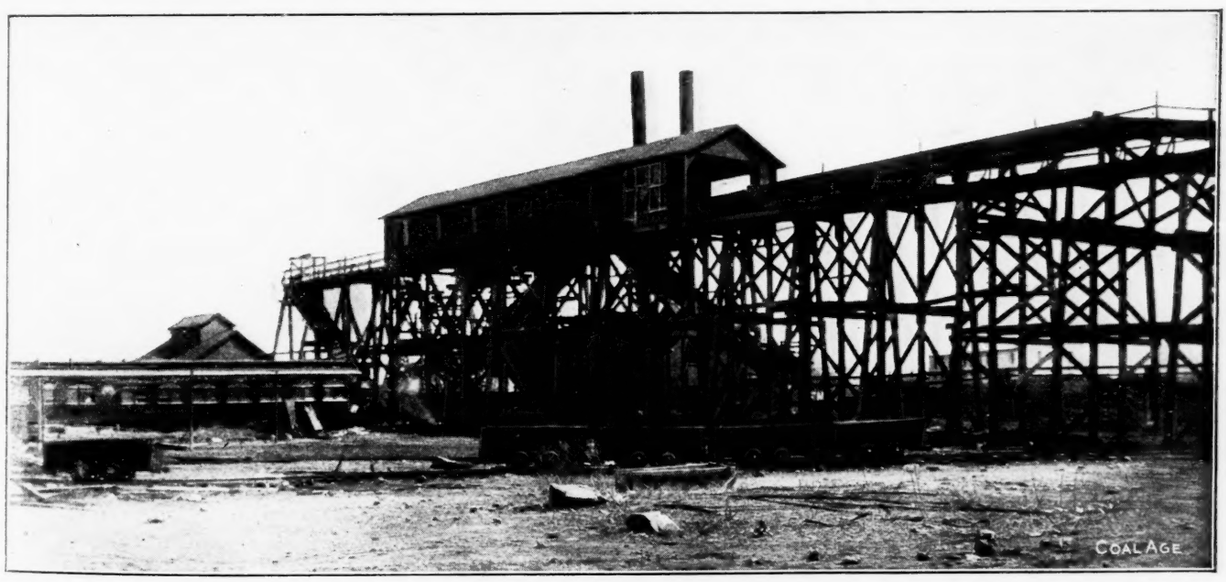
should have given ample ventilation, had the mine been in first-class condition.

A GAS EXPLOSION

On the morning of the explosion, the firebosses had "dead lined" several places, among which was the 11th South. At the time the explosion occurred, one of these men was building a brattice from the last crosscut to the face of the entry mentioned. He was found dead near this place with his safety lamp hooked in his belt, and it is supposed that as he worked his lamp came in contact with the gas and exploded, igniting the gas in the face of the entry. Or, it is possible that the gas was driven down the heading to a point where several diggers were waiting for their places to be cleared and was ignited by their open lamps. Several miners were found in this entry, still wearing their coats, as though, when the explosion took place, they had been sitting there, waiting for the fireboss to pronounce their places safe.

The only working places in the mine were the 12th and 13th North and 11th, 12th and 13th South. Although the mine was in a very dusty condition, it is not believed that a dust explosion took place, as there is no evidence of the dust having been burned in any place except near the face of the 11th South. The men recovered from this entry and from the 12th North were all badly burned, some of them beyond recognition, while those in the 12th and 13th South and 13th North were not burned at all, but perished apparently from the effects of the afterdamp.

There is a pump located in the 13th North which was operated by compressed air. Fourteen of the miners found their way to this pump and succeeded thereby in getting enough air to keep them alive until rescued. I talked with one of these men and he stated that he was in the 13th North at the time of the explosion; he did not see any flame, but knew from the concussion of the air that a violent explosion had taken place; he rushed to the main entry, and there met with extreme heat and smoke, through which he knew it was impossible for him to make his escape. With several other men, he rushed back to the pump, found a roll of brattice cloth and built a little room, so to speak, around the pump, and there the men remained about 20 hours. There were 11 men working outside of the 11th entries who made their escape unaided immediately after the explosion. All others, with the exception of the 14 who sought refuge around the pump, lost their lives.



THE TIPPLE OF THE SANS BOIS COAL CO., CHANT, OKLA.

The Rescue Work

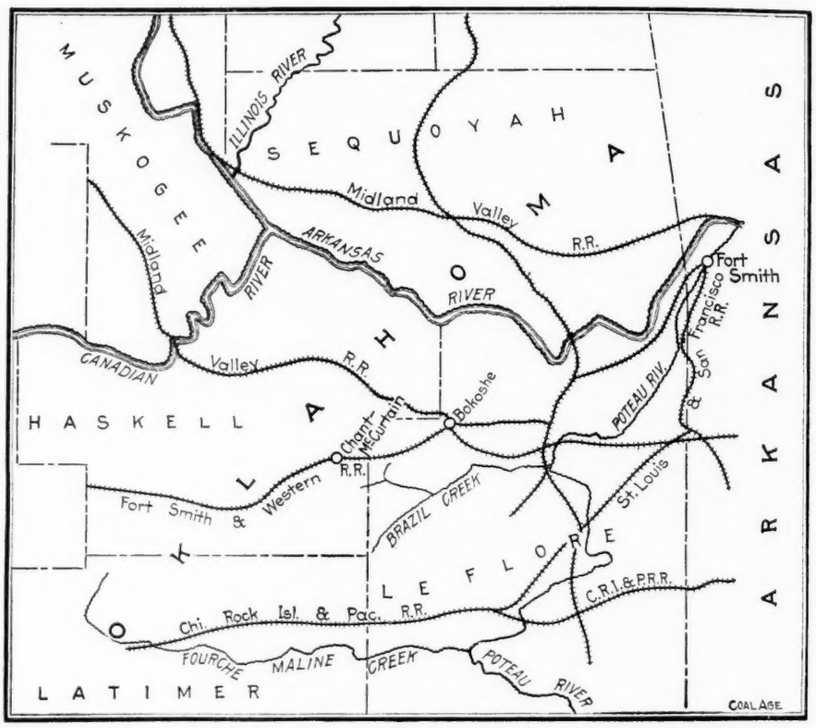
Immediately after the explosion, the Government Rescue Station located at McAlester was called upon. Their car and most of their paraphernalia was at Lehigh, Okla., and it was believed could not be brought to the scene of disaster in time to do much good. Mr. Burgess, the only member of the crew remaining at McAlester, was taken to McCurtain by special train with such paraphernalia as he had at hand. However, he was unable to accomplish much until assisted by the rescue corps from Iowa, which was sent for as soon as it was found impracticable to get the crew from McAlester.

The work of recovering the dead began immediately after the explosion, with practically no one in charge, as the mine manager and his assistants were all in the mine at the time of the explosion. Frank Haley, deputy mine inspector of District No. 3, arrived on the scene at six o'clock Wednesday night and took charge of the work until Chief Mine Inspector Boyle arrived. By that time, Thursday afternoon, ventilation had been established as far as room 12 of the 11th South. On entering the mine, he found the rescue party returning. The men stated that both entries from the 11th South to the face were full of gas and that they were unable to clear them any farther.

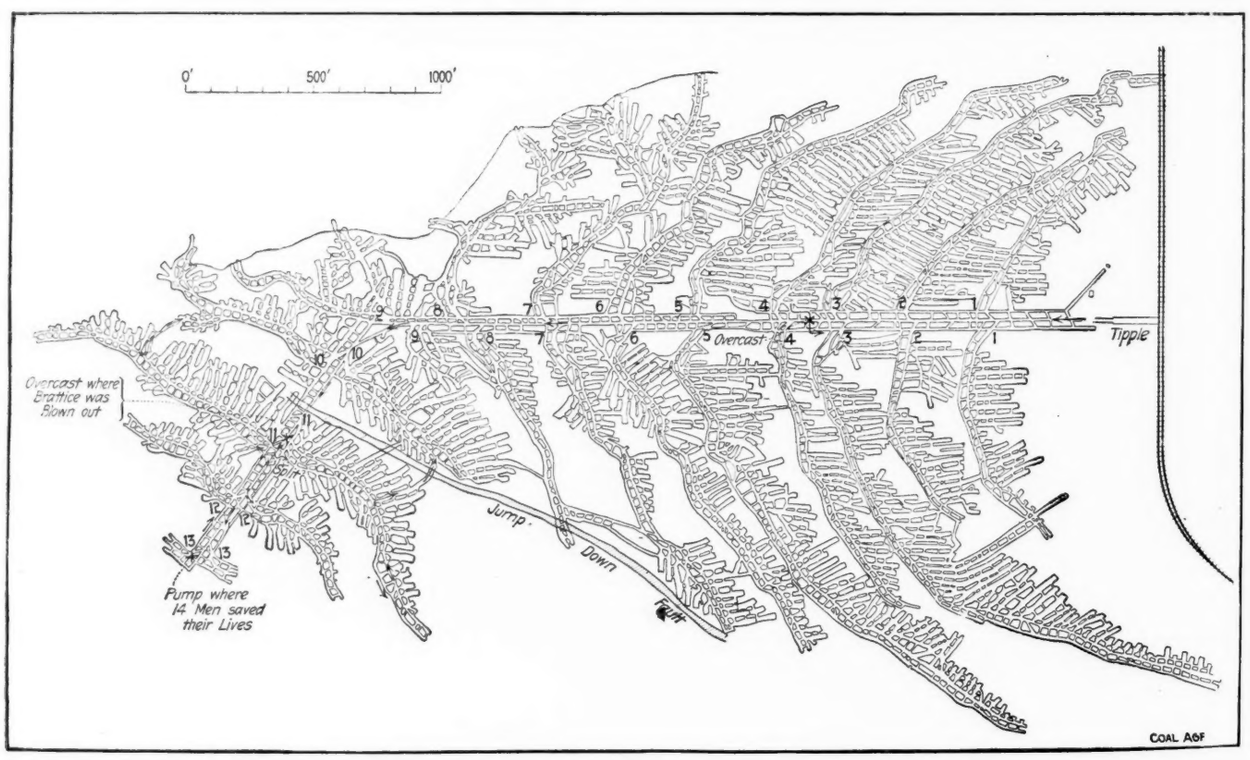
After a short consultation, Mr. Boyle ordered the entire party out of the mine with the exception of one man. He gave instructions that they were to remain on top and under no consideration to allow anyone to enter the mine until he came out. This happened about 6:30 Thursday evening.

The Hitch in the Rescue Work

Mr. Boyle and his companion explored the air courses and found that a brattice built in a disused overcast, just outside the 11th entry, had been blown out by the explosion, causing a short circuit of the air. This accounted for the explorers being unable to clear the entries any farther than mentioned. On his return to the surface about 11 o'clock, he found the men greatly agitated over his continued absence. Some of them, believing



Plan Showing Location of Chant Mine



Sans Bois Coal Co.'s Mine—Chant No. 2

that he had met with an accident, were in favor of organizing a party and going to his rescue, while others insisted upon obeying his orders and remaining outside until he put in his appearance. Had he remained inside a half hour longer, in all probability a fight would have taken place between the two factions.

Mr. Boyle immediately returned with a party of workmen and rebuilt the brattice over the overcast. As soon as this was completed, they went back to No. 12 room and found that the entry had been cleared for quite a distance inside this place. From that time on, it only required the rebuilding of brattices to establish ventilation all over the mine. As this work continued, other members of the party were removing those dead who were found in the entries, while the crew from the government rescue station with their helmets, explored the rooms and carried out such dead bodies as were found at the working faces.

Not a Violent Explosion

At the present writing, Mar. 27, all the bodies have been recovered except three, which are believed to be under falls of rock in the rooms. These bodies cannot be recovered until the rock has been cleaned up. The explosion brought down the roof in a few places and blew out most of the brattices, but otherwise little damage was done to the mine. The greatest danger with which the first rescuing party had to contend was the possibility that a fire might at any time ignite the gas, causing a second explosion. As they reached the 12th North entries, they found a door partially burned and several cars charred. These fires probably had been smothered by lack of air before ventilation had been established to this point. At this place they found several bodies badly burned, which led them to believe that all others beyond had met the same fate and they gave up the idea that anyone might still be alive at the pump. So instead of pushing forward they began to remove these bodies.

This mistake made it necessary for the survivors at the pump to remain there several hours longer than necessary. In fact it might be said that they were not rescued at all, but remained hovering around the air pipe until their leader, John Kokoski, was sure that he saw a light down the entry. A couple of the strongest of the party, feeling that they were able to reach assistance, made the attempt. Shortly after, those who were unable to get out by themselves were carried out by the rescuers.

Fan Did Not Work When Mine Was Idle

A week prior to the accident, the mine had been shut down as the boilers were undergoing repairs. This necessitated shutting down the fan; so for a week gas was allowed to accumulate throughout the mine. It can be seen readily that on account of the pitching seam, the last gas to be driven out would be that in the face of rooms going to the rise. Of course, before the men were allowed to enter the mine for work, all the working places had been examined by the fire-bosses and, as previously stated, several of them had been "dead lined." It is quite probable, however, that some of the abandoned workings still contained considerable quantities of gas which it would have been impossible to clear for several days to come, on account of the low crosscuts it had been the custom to drive. It is believed that when the gas was ignited at the face of the 11th South, the concussion forced the gas out of these abandoned workings, thus bringing it in contact with the flame, and thereby greatly increasing the force of the explosion.

By referring to the map it will be noticed that the mine was ventilated by two splits, the main air current entering the slope and passing down to a point just inside the 11th South. From this point, one split ventilated the 11th South, passing out of No. 12 room through the old workings to the air shaft. The other split ventilated the 12th and 13th South, 12th and 13th North and the old workings on the north side of the slope, crossing the slope at an overcast between the third and fourth lifts. It can readily be seen, when the brattice was blown out of the overcast just outside the 11th South, why it was impossible to ventilate the mine any farther than the 11th South until this brattice had been rebuilt.

There is considerable feeling among the miners and the townspeople against the mine officials. It is claimed by some that those who were in charge of the mine showed indifference in carrying on the rescue work. Superintendent Brown's apathy might possibly be accounted for by the sorrow and suffering which he witnessed around the slope mouth after the explosion, as it was enough to unbalance any man who might in any way feel that he was responsible for the suffering. Too much credit cannot be given Chief Inspector Boyle and his deputies for the heroic manner in which they carried on the rescue work.

Another Description of Jed Explosion

By J. H. Williams*

The Jed mine is operated by the Jed Coal & Coke Co., and is situated on Tug River, in McDowell County, W. Va., about 2½ miles from the town of Welch. It is one of the oldest shaft mines in this section of the state, having been opened about 1907.

The hoisting shaft, measuring 32x14 ft., is lined for 85 ft. with concrete. The air shaft is 18x14 ft., with a compartment, 4x14 ft., cased off for stairway and second opening. The shafts are 285 ft. deep and the hoisting shaft is located 300 ft. from the airshaft, where a 24-ft. diam. Guibal exhaust fan is used for producing ventilation.

The Coal and the Methods of Working

The celebrated No. 3 Pocahontas seam is mined at this operation. It has a thickness of about 5 ft. 3 in. and is overlaid with from 12 to 16 in. of fireclay slate. This slate underlies a seam of coal running about 3 in. thick with a stratum of black slate 4 to 8 in. thick above it. The fireclay slate is taken down in all the main and butt entries and propped thoroughly in all rooms and airways.

The mine produces about 700 tons per day and about 100 men are employed on the day shift and 20 during the night. The mine is developed on the panel system with three separate splits for the ventilating current, there being a double intake and a double return. The coal is known to produce marsh gas in small quantities and a line of brattice has to be conducted from the last crosscut up to the working face. Mule power is used for gathering the coal from the face and hauling it to the sidetracks, but from these sidetracks to the shaft it is hauled by electric power furnished to the motors by two 150-kw., 250-volt, direct-current generators. The coal is cut by the night shift with undercutting machines which also are driven electrically.

Precautions Taken to Protect Mine Workers

There were employed at this mine one mine foreman and four men with fire-boss certificates, one of the latter having charge of the night shift. This man was instructed to make an examination of the mine before the day shift came on. The other three men were employed as shot firers. The shots were fired entirely by electric batteries and clay was furnished for tamping, all the miners being instructed to use no other material for the stemming of their shots. Three shots were required for each working place. A center- or breaker-shot was

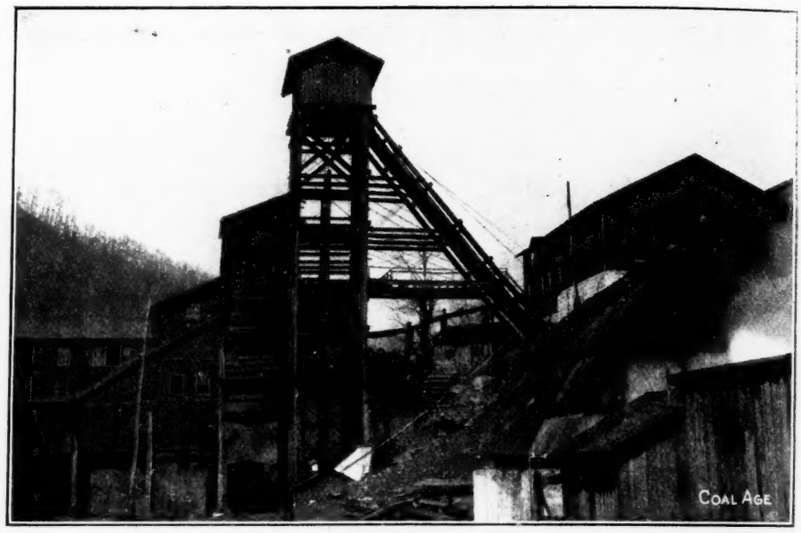
*Chief engineer, Jed Coal & Coke Co., Welch, W. Va.

placed near the center of the working face and after the coal from this shot was loaded out, two rib shots were fired in succession.

On Mar. 22, 1912, Wm. Leckie, general manager for the company, and Mr. McKent, inspector for the Fidelity & Casualty Co., went through the mine and reported favorable conditions. On the 25th I was through the No. 2 main section and noted that the moisture and ventilation were at least normal.

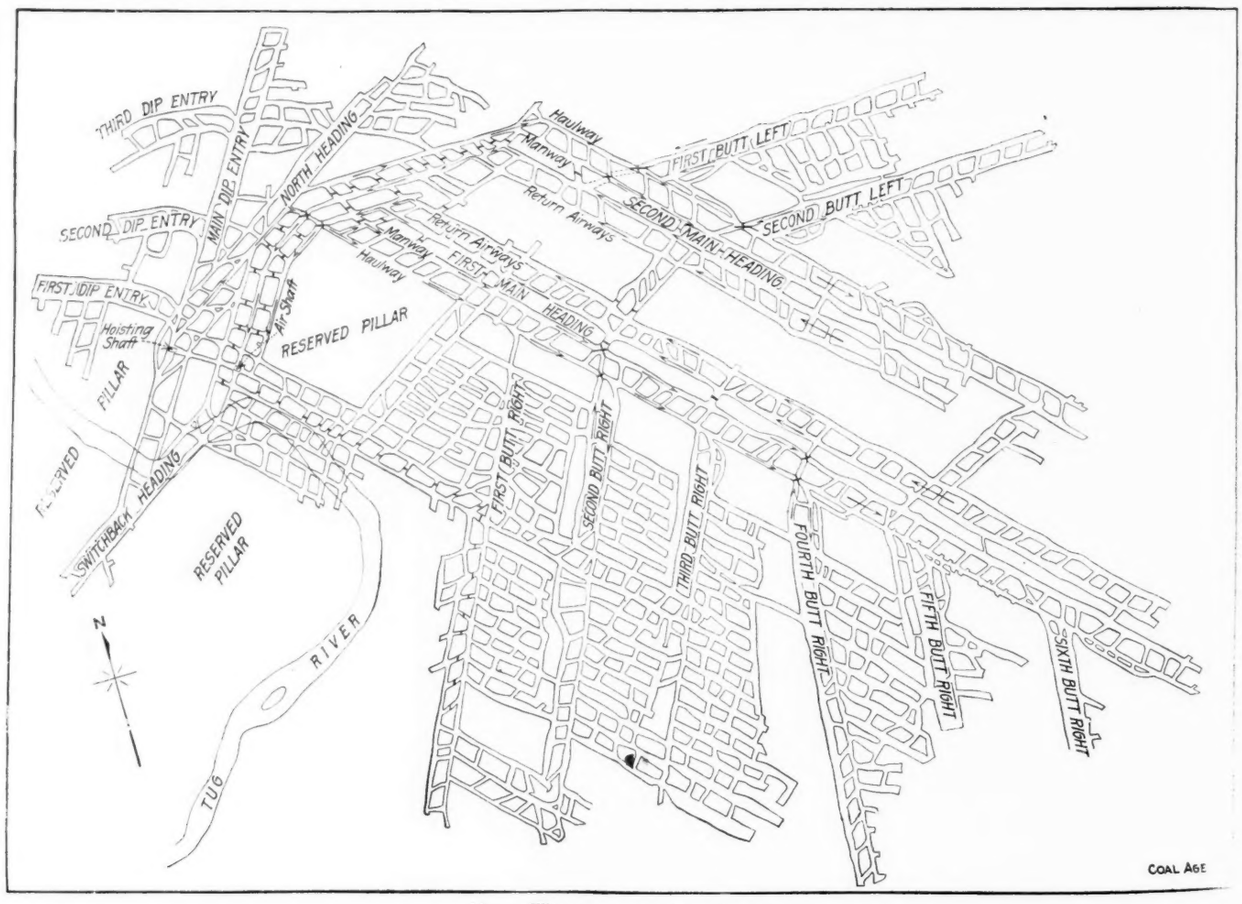
The Explosion

At 8:15 a.m., Mar. 26, 1912, after the fireboss had marked the board stating that the condition of the mine was "O.K.," and 93 men had descended, a gust of smoke shot up through the head frame over the shaft, producing a sound like steam blowing off through a huge pipe. This lasted for about one minute. Coal was being hoisted at the time of the explosion and the car on its way to the cage went into the sump on the right side. The mine foreman, who was at the bottom of the shaft, gave orders over the telephone to the top man instructing him to remove the loaded car from the left-hand cage and landing and to send the cage down. His orders were obeyed and when the car was removed, Supt. O. M. Knauff and F. C. Hendrichs descended with safety lamps.

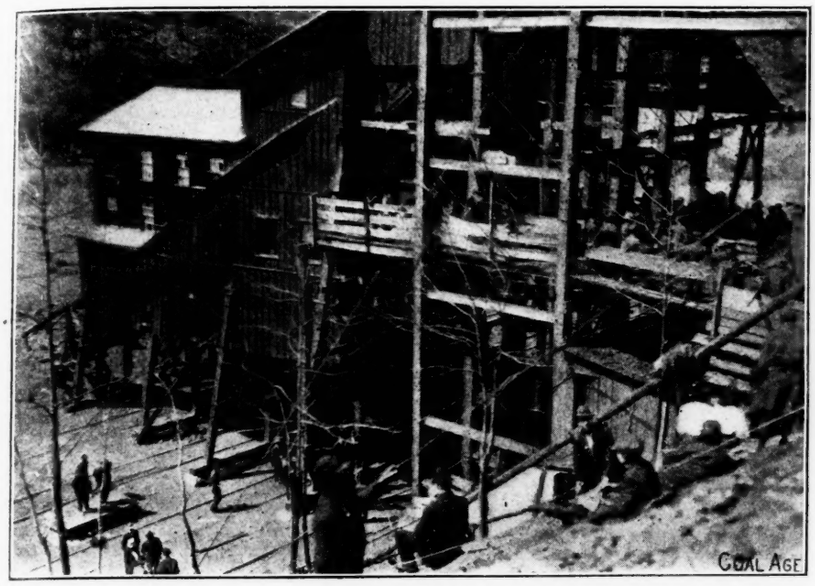


Jed Tipple and Power House

The cage came up again with ten men aboard who were in the immediate vicinity of the shaft at the time when the explosion occurred. The names of the ten men are as follows: J. S. Henry, Steve Chine, Frank Brudeski, George Savenski, C. F. Woodward, J. Klemens, Joe Egeski, Grant Herndon, Richard White, William Baker and John Owens. By this time some of the outside employees had secured three rolls of brattice cloth, nails, hatchets and safety lamps, and descended into the mine, going 9 ft. north to the door of the mouth at the first main heading, which was reached without bratticing. The door-boy was found at that point still living, but he died shortly after on being brought to the surface.



Mine Workings at Jed Shaft



CROWD AROUND THE TIPPLE SHORTLY AFTER THE ACCIDENT OCCURRED

A short time after the explosion, three men came out through an old airway from the face of the Second butt right off the First main entry. This gave reason for belief that other men were still living in the section ventilated through that entry, but a final exploration of the mine proved the contrary, and it seems improbable that any of the men in that section lived for more than a few minutes after the explosion.

RESCUE WORK

State mine inspectors Nicholson and Grady were on the ground about two hours after the explosion occurred and took charge of the rescue work. Meanwhile a general call was sent out for assistance. Many responded and with a corps of from 50 to 100 men, headed by various mine inspectors, including the chief of the state mining department, John Laing, and able mining men from the surrounding collieries, the work of recovering the bodies was hurried with all possible dispatch, but this work of recovery has nevertheless been comparatively slow on account of the heavy falls of slate resulting from the explosion.

Up to the present writing, Apr. 1, 72 bodies have been recovered. This includes the door-boy who died after being brought from the mine. The remaining eight or nine bodies are believed to be under the heavy falls of slate and it will be, in all probability, several days before all of them are removed.

The cause of the explosion is not yet known, and the State Mining Department will make an investigation next week to determine what was the origin of the disaster. William Leckie, general manager for the company, was in Williamson, W. Va., on the morning of the explosion, and there was no passenger train by which he could get to Jed before 10 o'clock. He boarded a coal train at 6 p.m., and on his arrival immediately went down the shaft. He has been working and directing the recovery of the bodies since that time. Mr. Leckie desires to thank the operators and other individuals in the field for their prompt assistance.

The Problem of Mine Timbering

By R. B. Woodworth*

Interesting cost data in connection with a number of installations of steel mine supports in various sections of the country are here presented in proof of the greater economy of steel as compared with wood. Preservative measures necessary to adequately protect steel in the mines are discussed. The fifth of a series of articles on mine timbering.

*Engineer with the Carnegie Steel Co., Pittsburg, Penn.

Note—Paper read before the Kentucky Mining Institute, Lexington, Ky., Dec. 11, 1911.

After all, does the use of steel for timbering purposes within the mines mean ultimate economy in expenditure, or will its use reduce the cost of production? A few typical examples will suffice to show what has been accomplished in this country up to the present time.

In 1908 at their Maxwell colliery the Lehigh & Wilkes-Barre Coal Company timbered a double-track gangway with 20 in. 65-lb. I-beam collars 17 ft. long between supports, and 8 in. H-beam legs 10 ft. 6 in. high in the clear, weighing, with base plates, 1,720 lb. per set. These took the place of wooden sets made of 24 in. round yellow pine timbers, the cost of which erected was $15.00 per set, weight 5,040 lb. and the life of which was two and one-half years. In view of their probable durability, the steel sets were erected on concrete bases and this added to the cost of installation, which reached a total of $40.00 per set.

PROVEN ECONOMY IN USE OF STEEL

Capitalized at 6 per cent. interest, the value of the steel sets at the end of 15 years will be $95.86 each, while the capitalized value of the six wooden sets needed in that time will be $153.56. At the end of the 15 years, the steel will have a scrap value per set of $12.03, while the wood will be worth nothing, a saving by the use of steel of $69.73 per set or $4.65 per year. The use of steel in English mines has effected a saving of 2c. per ton of coal mined.

The pump house at the Dodson colliery, of the Plymouth Coal Co., is 100 ft. long, 8 ft. high in the clear and 18 to 22 ft. wide. The roof is exceedingly tender and has caused all kinds of trouble in the pump house, especially in connection with the pipes. Before retimbering with steel, 18 in. to 22 in. round timbers were used, on 2-ft. centers, practically skin to skin. It is estimated that the pump room was retimbered once a year. Beginning with Apr. 16, 1910, the 70 sets of wood timbers were replaced by 48 sets of steel. The last steel set was placed Dec. 15, 1910. According to figures furnished by Mr. John C. Haddock, president of the company, the relative costs were:

1. Wood—70 sets; weight per set 4,150 lb.; cost per set f.o.b. cars at mine, $12.00; cost, erected in place, $34.50; total cost, $2,415.00; life, one year.

2. Steel—48 sets; weight per set 1,483 lb.; cost per set f.o.b. cars at mine, $31.47; cost erected in place, including concrete footings, $61.47 per set; total cost $2,889.09, or not quite 20 per cent. more than wood.

Based on its life, the cost per month of a wood set without interest was $201.25. The steel sets have now been in place 16 months; on which basis, their cost without interest has been $180.57 per month. They have shown no signs of

failure at last accounts; the concrete footings, where weakness would first make itself known, are intact, and the pump room troubles seem to be over. Any length of time the framing now stays in place means money saved.

Costs in Kentucky Mines

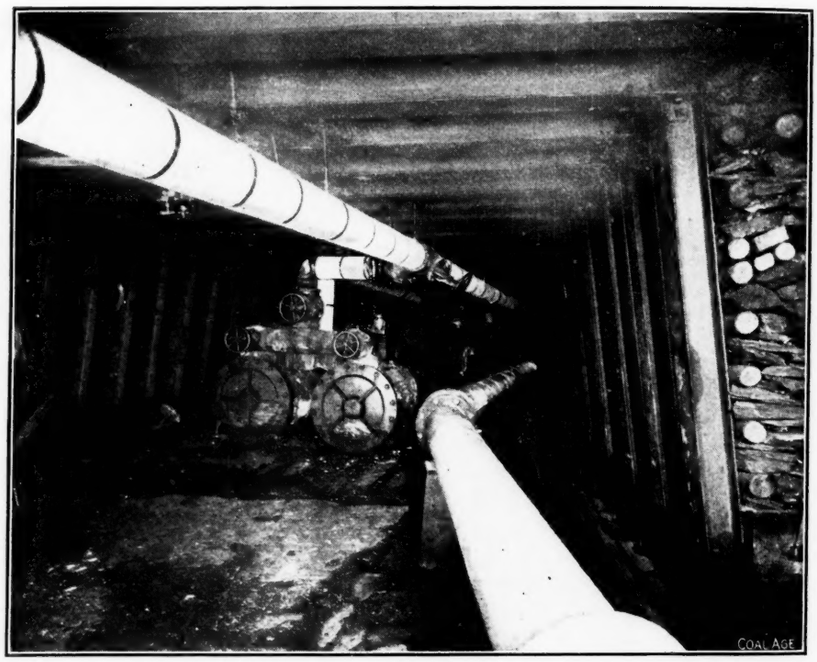
Development work is now in progress at the mines of the West Kentucky Coal Company, Sturgis, Ky. The seam mined is the No. 9 coal, West Kentucky coal measures, 4 ft. 10 in. thick. At the No. 8 mine, steel timbers are used in the new slope, both for the main entry and air course. The sets in use are composed of a 10 in. 25-lb. I-beam collar and 4 in. H-beam legs. They are spaced 3 ft. 0 in. on centers and lagged with oak plank 3 in. thick on top, and 2 in. thick on the sides. Between the sets, concrete is placed up to a height of 4 ft. This makes a solid reinforced concrete slope from the entrance to the point where the ribs are hard and top good. According to figures furnished by Mr. W. H. Cunningham, general manager of the company, the comparative costs of wood and steel for this mine were:—

Wood—Yellow pine creosoted; size 12 x 12 in., 264 ft. b.m.; cost at Sturgis, $10.56 per set; cost in place, $15.70; weight 1,575 lb.

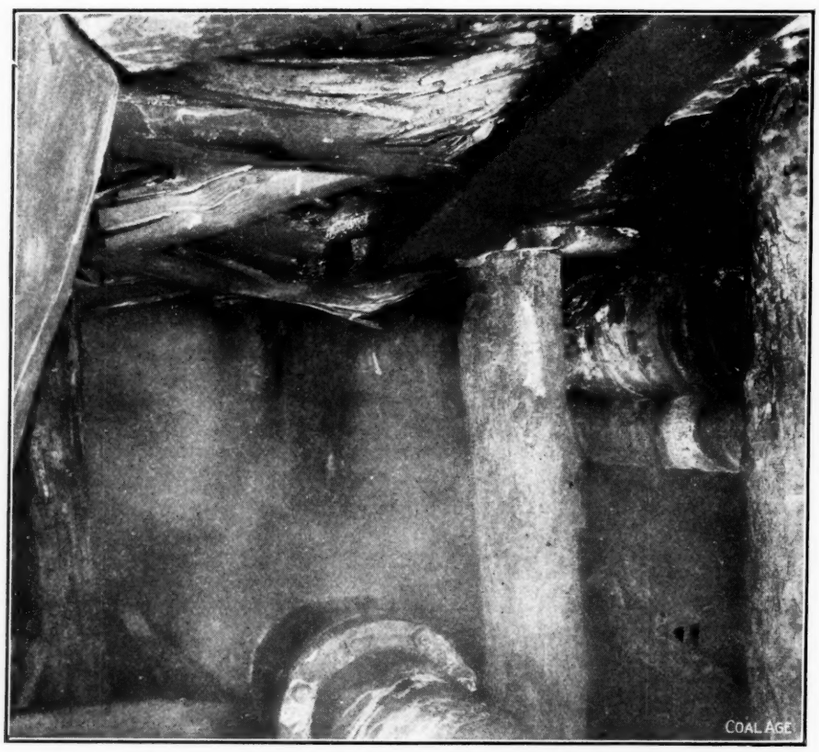
Wood—Native white oak; size 12 x 12 in., 264 ft. b.m.; cost at Sturgis, $7.92; cost in place, $13.06 per set; weight 1,340 lb.

Steel—Cost of steel at Sturgis, $9.75 per set; cost of placing $1.00; cost of concrete per panel $5.16; total cost in place per set, steel alone $10.75, steel concreted $15.91; weight of steel sets 425 lb.

Saving in the use of steel without concrete, over native white oak, $2.31 per set, over yellow pine $4.95. Excess cost of steel with concrete, over white oak $2.85 per set, over yellow pine $0.21. This favorable comparison is due to the high unit cost of the wood and to the elimination of waste. The safe uniformly distributed load on the wood collar is 1,200 lb., on the steel collar 26,000 lb. The safe compressive strength of the steel leg is 43,200 lb., while that of the wooden leg is 105,100 lb.; in the one case more than ample, in the other case out of all proportion.



Pump Room, Dodson Colliery, Plymouth, Penn.



Pipeway Leading from Pump Room, Dodson Colliery

It is not easy to obtain cost figures on the use of plain beams for roof supports, although they have found wide and satisfactory application in the bituminous mines of western Pennsylvania, southeastern Ohio, central Illinois and elsewhere. On Feb. 28, 1910, for example, the H. C. Frick Coke Co. had timbered with steel in this way 23 pump houses, 5 stables, 14 engine, motor and locomotive rooms, 10 shaft bottoms, 1 main butt haulage and 3 foremen's offices. Five of these structures were each over 300 ft. in length.

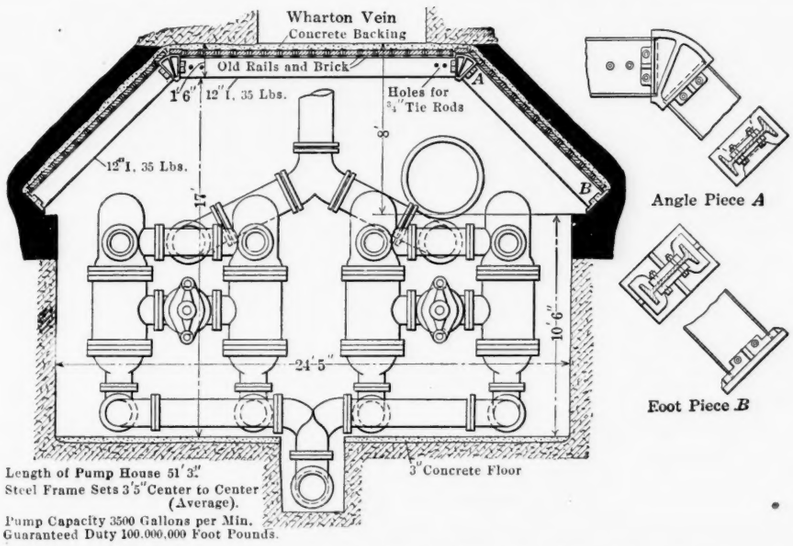
The mines of the Roby Coal Co., Adena, Ohio, have tender roofs, and at one time the haulways were considered the most dangerous in the district. Up to Dec. 31, 1909, as a result of systematic retimbering on a scientific basis, 2,133 steel I-beams and 1,032 8 x 10 in. oak timbers had been placed in Drift No. 1, and 1,490 steel beams and 943 oak timbers in Drift No. 2. The thirty-fifth annual report of the Chief Inspector of Mines for the State of Ohio thus comments on this work. "Even with all this timbering which has been done in the last two or three years

the management informs me that the cost of production is a great deal less than when they attempted to operate without properly timbering the haulways and taking the risk of no one being there when a fall occurred. This demonstrates that in keeping a mine up to a high standard of safety the efficiency is increased and the cost of production decreased."

Secondary Benefits

Apart from the mere question of cost, the collateral benefits which either accompany or proceed from the use of steel in the mines are not unimportant. They are:—

1. Reduced excavation: In the Lehigh & Wilkes-Barre installation the same clear space inside was obtained with steel which required an excavation 4 in. less in height and 32 in. less in width than that needed with wooden timbering.



Steel Timbering in Pump Room, Hazleton Shaft Colliery

In the Dodson colliery the space saved was 2 in. in height and 28 in. in width; in the West Kentucky installation. 2 in. in height and 16 in. in width. This does not mean much when the heading is through solid coal, but it does mean a real gain when timbering a mine shaft or in driving main haulage ways where the coal seam is thin, say less than 6 ft. in thickness.

2. Better ventilation: The presence of all stages of decay in wooden mine timbers means vitiated air and discomfort, possibly ill health to the miners. One but needs to walk through a steel-timbered heading to note how much better the air conditions are made; not to mention the smaller resistance that steel offers to the passage of the air currents.

3. Less dust catchment area: Everyone knows now that coal dust is explosive and its accumulation on mine timbers a constant menace. The smaller area of the steel timbers and the ease with which they may be cleaned adds to their value in this direction.

4. Fireproof character: If there were no other considerations favoring the use of steel within the mines, this one would be sufficient. Fire zones underground, shafts, pump houses, powder magazines, locomotive rooms, mine-boss shanties and stables, need protection by the use of fireproof materials of construction. Fire-proof structures underground mean safety and mine insurance and therewith incalculable reduction of expense in maintenance and replacement.

Preservative Treatment of Steel

Like wood, steel is subject to deterioration in the course of time but the process takes much longer than in the case of wood. This action may, moreover, be prevented and the durability of steel, on which its economic advantages are based in part, may be much enhanced by simple means.

The corrosion of structural steel within the mines is not so serious a problem as it is above ground. The standard objection, based on what is alleged to have happened in the case of rails exposed to acid mine water, has no real validity as concerns the use of structural steel for mine timbering. Rail steel is not structural steel. Rails are laid naked, as a rule in contact with the sulphur in the debris which usually covers the track, and frequently wet by running water; moreover, their tops are polished by passing wheels and thus kept in the best condition for the attacks of corrosion. Far better than *a priori* reasoning on this subject are the facts of experience. The steel mine timbers installed by R. V. Norris in 1897 at the foot of Stearn's Shaft, Susquehanna Coal Co., are in use to-day practically unharmed by the lapse of time; so also are those installed in the same year by S. D. Warriner and W. A. Lathrop in the pump room at Hazleton Shaft Colliery, No. 40 Slope, Lehigh Valley Coal Co., and likewise those installed in 1896 by J. A. Ede at No. 1 Shaft of the Spring Valley Coal Mines, of the Spring Valley Coal Co. in the northern Illinois bituminous coal district. Surely 16 years of service suffices to give steel a just claim to permanence.

Steel for mine timbering should not go into the mines unpainted, unless it is to be covered with cement. No one would think of using it unpainted above ground unless so protected; and the principles of right use are the same in both cases. But if well painted before installation, there is no real reason why the timbering should not outlast the life of the mine without renewal.

A paint which will chalk, or peel, or blister, or alligator and go to pieces on the outside of a house, will stand up on the inside and look well until it gets so dirty or so old one is tired of it and wants a change, and even then the work underneath is just as good and fresh as when the coat was first put on. Now, conditions within the mines are analogous to those within the house. The causes which destroy paint films above ground are not here operative, and that is the reason why paint put on beams in the mines 16 years ago is still there and doing its work of protection to-day; and why we may be quite confident that when we put painted steel in the mines, it will do service, without renewal, as long as needed.

Effect of Mine Water

The effect of mine water has been much exaggerated. Laboratory and service tests show that the prevention of its deleterious action on steel mine timbers requires only the careful selection and application of good paints; an inhibitive first coat with an excluder second coat well rubbed in on clean surfaces. The first coat should be preferably red lead or natural iron oxide, the second coat a good graphite. The graphite should be made from the ore, for paint purposes, not from the refuse left in other processes of manufacture. Just as it is an economic crime to use wood in timbering permanent mine headings, so it is an economic crime to trifle with poor paint on surfaces of prospective permanence, not readily accessible for repainting. After all, the main cost of painting is the expense for labor and it does not pay to scrimp the paint.

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

Nonfreezing Concrete Mixtures

The following data are taken from two recent issues of the "Quarterly" of the National Fire Protective Association:

The amounts of salt and calcium chloride required to keep water from freezing at different temperatures are tabulated below. The salt should be thoroughly dissolved or the results will not be satisfactory. Calcium chloride is said to be superior to sodium chloride in that it does not corrode steel tanks and the hoops of barrels. Where calcium chloride is used the wooden barrels should first be well coated inside with asphaltum, or a mixture of crude paraffin and resin, to prevent the shrinking of the staves and subsequent leakage:

FREEZING POINTS OF SALT SOLUTIONS

Common Salt (Sodium Chloride)		Commercial Calcium Chloride	
Pounds per Gallon	Freezing Point, Degrees Fahrenheit	Pounds per Gallon	Freezing Point, Degrees Fahrenheit
½	24 above zero	½	29 above zero
1	18 above zero	1	27 above zero
1¼	15 above zero	1½	23 above zero
1½	12 above zero	2	18 above zero
1¾	9 above zero	2½	4 above zero
2	6 above zero	3½	6 below zero
2¼	3 above zero	4	17 below zero
2½	1 above zero	4½	27 below zero
3	3 below zero	5	39 below zero
3½	8 below zero	5½	54 below zero

Glycerin is recommended for use in chemical fire extinguishers. It has no effect upon metals, but has a tendency to disintegrate rubber. It has been stated, however, that the continued use of glycerin in water renders it liable to a decomposition that would develop compounds having a corrosive action on metals. When using glycerin it should be remembered that one gallon weighs 10½ lb. The following proportions may be used:

FREEZING POINT OF GLYCERIN

Glycerin, Pounds per Gal.	Temp. Solution Will Withstand
3½	+10 F.
5¼	—10 F.

Denatured alcohol has advantages over both glycerin and calcium chloride as a nonfreezing element in water solutions, for it has no injurious effect on either metal or rubber. A solution of about 50% is inflammable; however, it would rarely be necessary to have a solution of over 30% alcohol.

FREEZING POINT OF ALCOHOL

A 20% solution freezes at +10 F.
30% solution freezes at — 5 F.
40% solution freezes at —20 F.
50% solution freezes at —35 F.

Gas Engines for Collieries

By Alan E. L. Chorlton

Gas engines are being largely used at British collieries for the generation of power. The gas is either generated in producers or in coke ovens. Producers can be sometimes made to yield such profits from byproducts, where the fuel is of low grade, that even without using the gas produced, the installation will justify its erection.

Paper read before the Midland Institute of Mining, Civil and Mechanical Engineers.

It will be readily granted that gas engines occupy the leading position among all the agencies now used for the generation of power.

The use of gas power in collieries has been already much advocated by far-seeing engineers, because it is more economical than other methods of making use of the stored up energy in coal. Even with the use of such gas generators as have no provision for byproduct recovery, the economy secured is from two to three times greater than can be obtained with the ordinary steam systems now in vogue. And this is even more apparent when the plant works by steam and for only one shift a day. Large banking and radiation losses result from the inactivity of the plant during the night.

In the past, many authorities had doubts whether gas engines could be relied on as power producers. These doubts probably account for their comparatively slow progress in popular favor. But increased experience has now fully succeeded in overcoming former weaknesses.

For Poor Fuel or Economical Use of Good Fuel

The most economical processes of gas generation for power purposes are either those which use mainly a fuel of little or no market value, or such processes as produce a considerable quantity of gas as a byproduct, and yet are complete and commercially profitable in themselves. As an example of the first, the ammonia-recovery producer uses combustible nitrogenous material from belt pickings, tips, etc., mixed, perhaps, with some coal, the whole being of low market value. This produces a large amount of power gas and ammonium sulphate as a byproduct. In the second class is the byproduct coke oven, using fine coal and producing furnace coke, with many byproducts and a considerable residuum of gas available for power or other purposes. There are combinations of the two, but, so far, they do not appear to have been developed practically, although it is possible that still further economies will be secured by their use.

The distinctive features of the two methods are as follows: When operating a byproduct coke plant (1) the coal must be of the coking kind; (2) the percentage return on capital will be high, even when the value of waste gas is not considered; and (3) the free gas for power purposes in proportion to first cost is low. When operating an ammonia producer: (1) Any poor fuel containing up to 40% of ash can be used; (2) the percentage return is high only when the gas is sold or profitably used; and (3) the available amount of free gas for power purposes is great. Table 1 has been prepared from information received from the manufacturers of large plants of both types, and even if the results obtained in practice do not show so favorable a result, the return on capital is still high.

Use Gas Producers If Much Gas Is Needed

Profitable results can be obtained from large Mond gas producers by the use of cheap or refuse coal, but their economies can only be of avail if there is sale or profitable employment for the large quantities of gas produced. This condition might somewhat limit their use to large

power companies or groups of collieries. On the other hand, the byproduct coke plant gives a higher return when the lack of use for the waste gas makes it impossible to set a value on it. From the particular point of view of power production for the single colliery of 3000 hp. and its direct application, Table 2 has been prepared on a horsepower basis.

Most English collieries have enough of such waste products as will yield sufficient nitrogen to render them suitable for use in a byproduct gas producer. Hence the proportion of such waste fuel has been made large in making this comparison. The important point about either scheme is that the gas for power is obtained at a very low cost—that is, at a low running charge for fuel, and obviously at a great economy over the usual plan of burning saleable coal under boilers. The values for the above tables are primarily governed by the load factor.

In development of these plans, a combination gas generator might be employed, having continuous vertical retorts (such as are now used in town gas works) which would feed coke direct into a producer beneath. Suitable regenerators could be added to utilize the waste heat of the escaping gases. The economies that can be secured in suitable cases by combining with other power consumers, or with power supply companies, in the use of these processes, so as to dispose of the excess power or gas at times of light loads, etc., are not here considered.

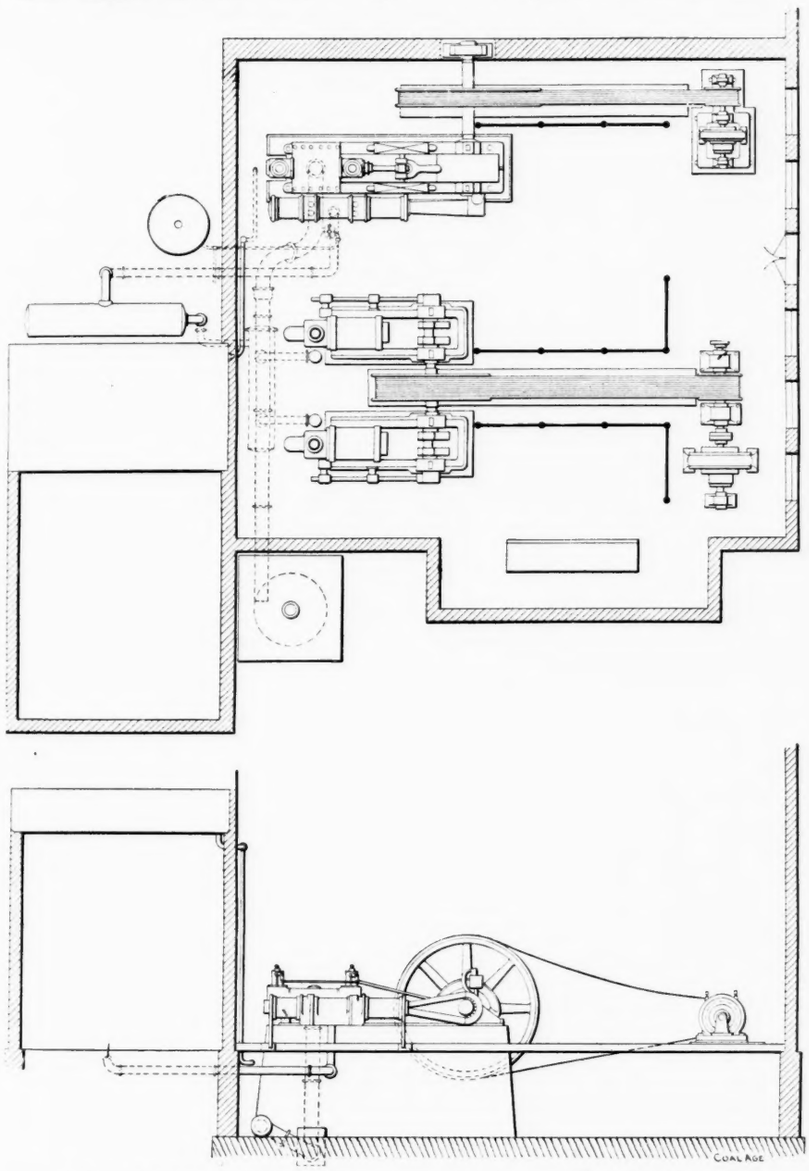


FIG. 1. AN ENGINE USING GAS FROM SIMON CARVÉS OVENS, WHARNCLIFFE SILKSTONE COLLIERY, ENGLAND

CLEAN GAS MORE RELIABLE

For the satisfactory use of any gas in large engines, be it coke-oven or producer gas, a thoroughly adequate cleaning plant must be provided, which will amply repay its cost in the increased reliability of the engines and in the reduction of cost for upkeep, etc. Great stress must be laid on this point, and it is advisable to lay down a larger plant than is usually offered in competitive tenders.

Continuity of gas supply is, of course, absolutely essential, often rendering advisable the provision of large holders. For producers using poor fuel, these holders, while advantageous, are not necessary, as the producer can be kept at work continuously for long periods, and will respond quickly in output to meet sudden demands.

TABLE I. RESULTS FROM COKE OVENS AND MOND PRODUCERS CAPACITY OF 90,000 TONS OF COAL PER ANNUM (VALUE OF GAS INCLUDED)

(1) BYPRODUCT COKE OVENS	
Capital stock of complete plant...	$219,150.00
Costs	
Coal, 90,000 tons at $1.7045.....	$153,405.00
Running charges, including taxes, labor, superintendence, steam power, lime, oil, repairs, stores, etc., at $0.60875 per ton.....	54,787.50
Sulphuric acid at $8.52 per ton...	9,238.39
Interest and depreciation at 10%.	21,915.00
Annual cost.....	$239,345.89
Gross Profits	
Sulphate at $58.44 a ton.....	$68,374.80
Tar at $4.87 a ton.....	17,532.00
Coke at $2.92 a ton.....	184,086.00
Crude benzol at 8.12c. per gal....	18,262.50
Surplus gas at 0.0812c. per unit..	12,272.40
Gross annual receipts.....	$300,527.70
Net profits.....	$61,181.81
(2) MOND GAS PRODUCERS	
Capital stock of complete plant..	$253,240.00
Costs	
Coal, 45,000 tons at $1.7045.....	$76,702.50
Coal, 45,000 tons at $0.9740.....	43,830.00
Running charges, including taxes, labor, superintendence, steam power, repairs, stores, etc., at $0.60875 per ton.....	54,787.50
Bags and packing sulphate.....	5,844.00
Sulphuric acid at $8.52 per ton...	30,681.00
Interest and depreciation at 10%.	25,324.00
Annual cost.....	$237,169.00
Gross Profits	
Sulphate at $58.44 a ton.....	$210,384.00
Tar at $3.65.....	13,149.00
Surplus gas at 0.0812c. per electrical unit.....	79,137.50
Gross annual receipts.....	$302,670.50
Net profits.....	$65,501.50

TABLE II. RESULTS FROM A MOND PRODUCER PLANT FOR A COLLIERY REQUIRING 3000 B.HP., USING A HIGHER PROPORTION OF WASTE FUEL (VALUE OF GAS NOT INCLUDED)

Capital cost of complete plant....	£64,284.00
Costs	
9,600 tons of carbonaceous shale..	nil
900 tons of belt pickings.....	nil
1500 tons of waste slack at $0.9740	$1,461.00
660 tons of washed slack at $1.9480	1,168.80
Running charges, including taxes, labor (including packing), steam power, repairs, stores, etc., at $0.60875 per ton.....	7,670.25
Sulphuric acid at $8.52 per ton...	3,238.55
Interest and depreciation at 10%	6,428.40
Annual cost.....	$19,967.00
Gross Profits	
Sulphate at $58.44.....	$22,207.20
Tar at $3.65.....	876.60
Gas (not included)	
Gross receipts.....	$23,083.80
Net profits.....	$3,116.80

Low-grade Gas Needs High Compression

If there is any likelihood of considerable variation in calorific value from whatever reason, be it change in fuel or other cause, precautions should be taken in the design of the engines themselves to meet it by excess of capacity, the adjustability of compression, and other provisions.

Turning now to the engines themselves, the only material change needful to fit them for operating indifferently on high-grade coke-oven gas, or low-grade producer gas, is a provision for regulating the degree of compression. Thus, for a high-grade coke-oven gas, a compression of about 100 lb. would be used, while for low-grade producer gas it might be raised as high as 150 lb. In other particulars the engine will be built in the same manner, although with an intensely active gas, such as coke-oven gas (with its high content of hydrogen), it is advantageous to scavenge the cylinder of air effectively, and to provide additional water cooling so as to minimize the risk of preignitions, with their attendant detriment to the reliability of the engine. It may be stated that for large engine work, the mean pressure effective in the cylinder in order to carry a continuous full load should not be more than 70 lb. per sq.in. when producer gas is used. This pressure may be increased to about 80 lb. for coke-oven gas, and an engine working on such a gas is therefore rather more than 10 per cent. more powerful than when working on producer gas.

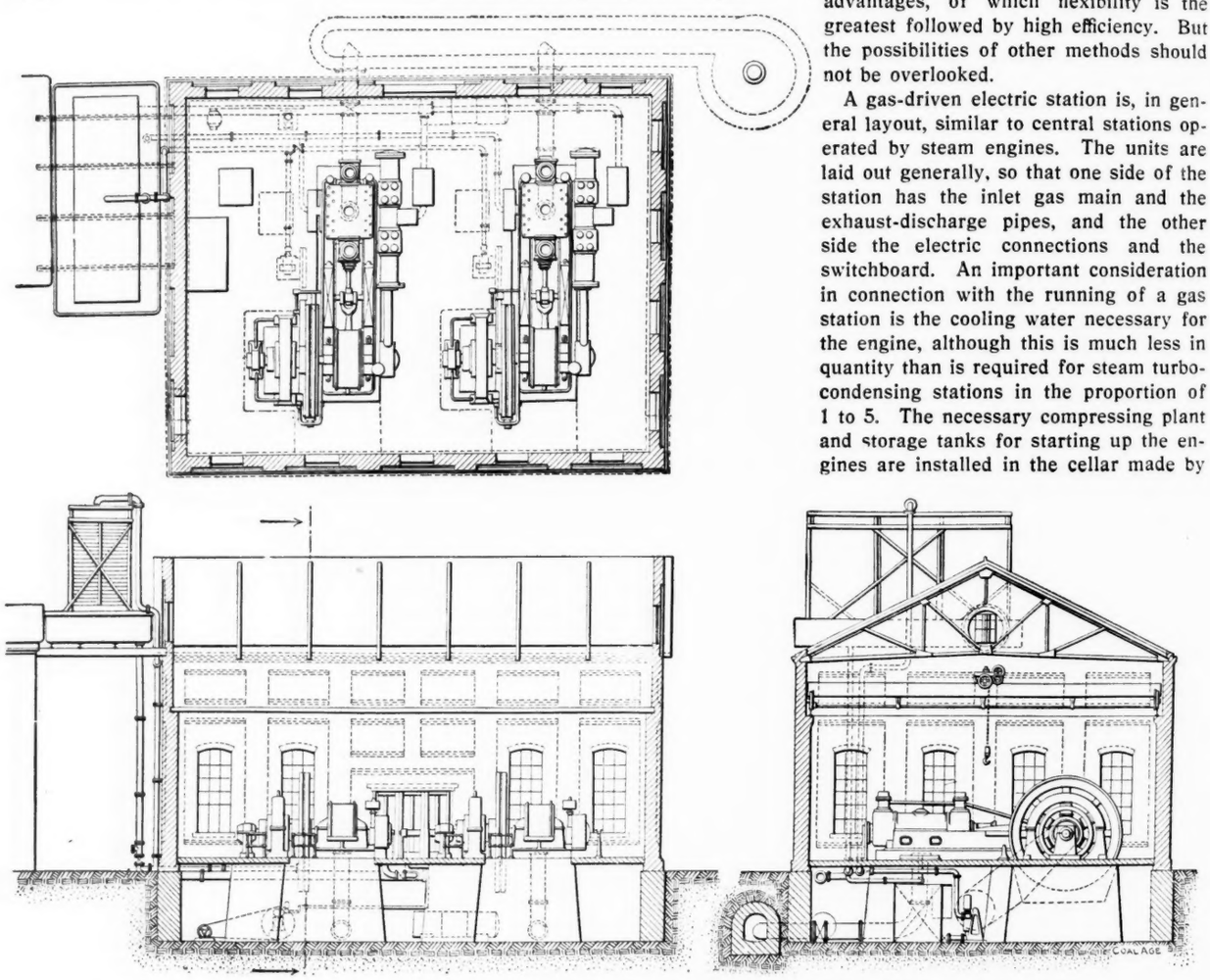


Fig. 2. Engine Installation at Rockingham Colliery. Gas Used Is From Koppers Coke Ovens

Five Applications of Gas Power

The possible methods of application of gas engines to the many mine requirements are mainly four in number, namely: (1) Electric, (2) hydraulic, (3) pneumatic, (4) mechanical or direct, and (5) various combinations of these four. Each scheme has certain advantages, and so the greater number of modern collieries use most of them in part in their general layout. Their relative positions in popular favor may have to undergo some alterations, especially if there is any further restriction in the use of electricity underground. In the latest steam-driven collieries all the power units, as far as possible, have been installed in one house on the surface, in order to secure the advantages of the single central station, in labor, maintenance, etc.; and the writer would propose to adopt the same principle in the design of the various schemes which follow.

The Electric Scheme

The method usually adopted in the utilization of gas power for collieries is to convert the energy at once in a central station into electric power. This scheme has many advantages, of which flexibility is the greatest followed by high efficiency. But the possibilities of other methods should not be overlooked.

A gas-driven electric station is, in general layout, similar to central stations operated by steam engines. The units are laid out generally, so that one side of the station has the inlet gas main and the exhaust-discharge pipes, and the other side the electric connections and the switchboard. An important consideration in connection with the running of a gas station is the cooling water necessary for the engine, although this is much less in quantity than is required for steam turbo-condensing stations in the proportion of 1 to 5. The necessary compressing plant and storage tanks for starting up the engines are installed in the cellar made by the foundations, such a cellar forming in modern practice an effective and well lighted basement to the engine house. Boilers normally heated by the exhaust gases are necessary for the various steam requirements of both the compressing plant and the gas producer.

Suggested Modification of Hoisting Methods

Another arrangement of a gas-driven electric central station has been devised by the writer, whereby considerable economies are obtained in capital expenditure. The *raison d'être* of this scheme is, that where hoisting is the principal absorbent of power in a colliery, it should receive most consideration in a layout. In an all-electric scheme, the use of regener-

ative compensator sets, between the generator and the hoisting motors, accounts largely for the considerably higher first cost of electric hoisting, as compared with steam methods. In this scheme the writer proposes to drive the compensating regenerative sets direct from the gas engine, thus replacing the three-phase motors by ropes and saving the capital cost of these motors, together with that of the main generator in the central station, but adding thereto the cost of the rope drive. The difficulty of running the central-station machines in parallel is a disadvantage, but the machines may be arranged in size to compensate for this, so that one standby or one unit is common to the whole. The station thus consists of a number of flywheel direct-current machines, all rope driven from gas engines. If it is essential to use three-phase high-tension current as well, then such generators must be added. Before proceeding further, a brief description of some such layouts will be given.

Shelton Iron, Steel & Coal Co.'s Power Station

The Shelton station contains two 400-b.hp. two-cycle gas engines, driving directly 500-volt direct-current generators. These sets have been in operation now for over six years; and were, so far as the writer is aware, the first two-cycle gas engines using coke-oven gas. The gas used is that obtained from a battery of Simon-Carvés ovens, and the engines for the most part have used it without any extra cleaning. Experience has shown, however, that an extra cleaning plant could have been installed with many advantages.

The water for cooling is drawn from an adjacent canal, and returned after use, a turbine pump being the circulating agent. These engines are not of recent type, but in general they have worked successfully under the extremely varying load and conditions existing. The use of the current generated is in this case not confined to collieries.

Wharncliffe Silkstone Colliery Power House

At the Wharncliffe colliery the economical advantages of gas-engine driving have been appreciated for many years, and this plant was probably one of the earliest to use the waste gas from coke ovens. Fig. 1 shows a station, which is not the original, but one installed at a later date at this colliery. This plant is of a different type from the preceding one, as the engines drive the generators by means of ropes, thus securing an economy in the capital cost of the generators. The engines shown on the plan consist of a single-cylinder, two-cycle engine, and a twin-cylinder four-cycle engine, both of which operate on the gas obtained from Simon-Carvés ovens. The power generated is led away for use at the surface for air compressing, coal washers and screens, and below ground for hauling, lighting and pumping. The ventilation is at present performed by a steam engine.

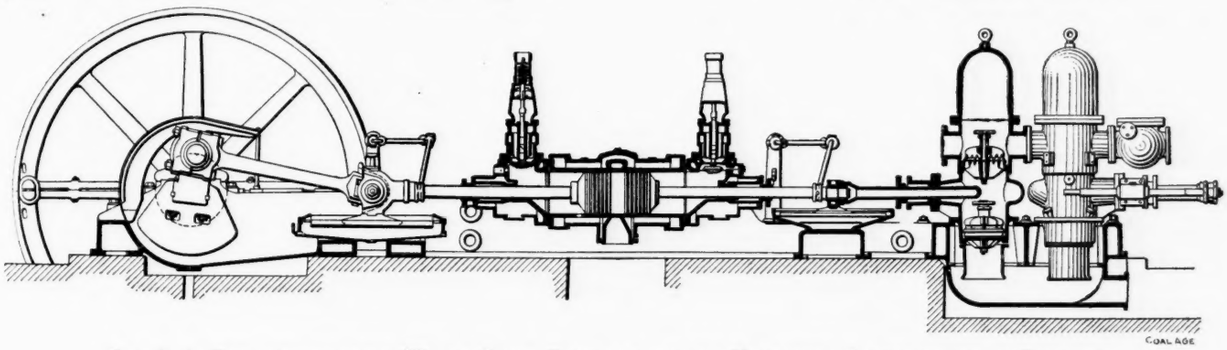


Fig. 3. A Gas-engine-driven Water Pump, Designed for the Hydraulic Operation of a Colliery

Rockingham Colliery Power House

Fig. 2 shows a central power station recently set in operation. It has, up to the present, only one unit, and this is a 600 maximum b.hp. two-cycle engine, driving a direct-current generator. The engine operates on gas of 530 B.t.u. heat value, obtained from Koppers coke ovens, and the current is led away by means of aluminum overhead trunk lines to distant collieries for use in hauling, coal cutting, lighting and pumping.

As an instance of the generation of power by the use of waste fuel in Mason gas producers, mention is made of an all-electric installation at a colliery in South Wales, where the "Bastard" coal, which forms the roof of the seam, is used. By-product recovery is not installed, the gas after being cleaned proceeding to the engines direct. These are of the twin two-cycle type, and are each capable of working up to 800 b.hp. The alternating-current generators of a voltage of 2200, and a frequency of 25, are situated on the crankshaft between the cylinders. A motor-driven centrifugal pumping plant is used for circulating the cooling water. As it is necessary in these producer plants to have the use of a considerable amount of steam, exhaust-heat boilers are fitted to the exhaust of the engine, with the attendant gain in economy. The power from this station is used in the first place for a large haulage engine, then for driving ventilating fans and screens, and for general surface driving. Lighting is provided through a motor-generator, which converts the current to a suitable voltage and provides also for the exciting of the main generators. The fuel used yields a high percentage of ash, and the value of the gas generated is 140 B.t.u. per cu.ft. An effective cleaning plant is necessary, owing to the large amount of tar present in the gas. It has been found advantageous to install a large gasholder, so as to equalize any irregularity in the working of the producer.

I have been connected with the erection of a power plant of a much larger capacity, which has only recently been installed in the Staffordshire district, where the producer plant uses waste fuel with full ammonia recovery.

The Hydraulic Scheme

This method involves the conversion of the power generated by the gas engine by means of direct-connected pumps working at high pressure. The method was brought to its highest efficiency in Germany. A plant installed at the Herkules pit, near Essen, gave when tested an efficiency of as much as 78 per cent. The high pressure pump on the surface is connected by a main carrying water at high pressure to a special reciprocating water-motor-driven pump in the mine, the discharge being returned to the inlet of the pump at the surface. This system, if intended to perform the various other duties below ground, may be costly both in first charge and upkeep, but its high efficiency is in its favor, and in Germany there are many installations of the kind for pumping only. There is no doubt that this system could be, and perhaps has been, adopted for hauling, etc., and might possibly be applied to hoisting, but with greater difficulty. No installations of this system appear to have been laid down of late years. The hydraulic accumulator offers an excellent method of dealing with peak loads. This system is sometimes used, as in America, to operate water turbines underground. Fig. 3 shows a direct gas engine-driven pump suited to such service.

(To be continued)

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

If the life story of any man engaged in coal mining is calculated to encourage and inspire others to strive for success, then surely the following sketch of Morris Williams, president of the Susquehanna, and all the other coal companies owned by the Pennsylvania Railroad, will accomplish that laudable aim.

Born in Monmouthshire, Wales, in 1855, Mr. Williams was brought to this country by his parents, who emigrated to Pennsylvania while he was still an infant. The family settled in Schuylkill County, and at 13, Morris was attending school in winter and picking slate in a breaker during the remainder of the year.

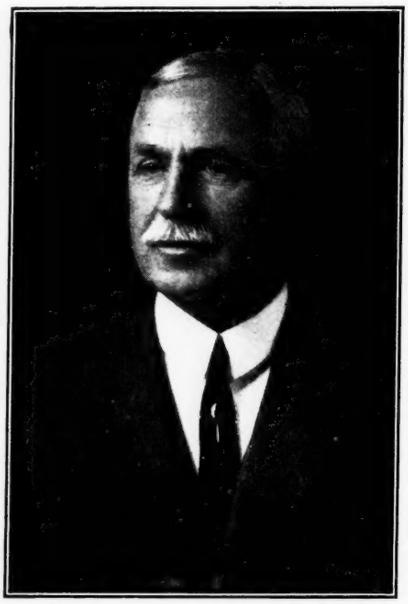
When 17 years of age, Mr. Williams secured employment underground in one of the near-by collieries, and after serving in the capacity of mule driver, as well as filling other jobs about the pit, he became a full-fledged miner, and dug coal until he was 21 years old.

Having saved a part of his earnings during this period of hard labor, "M. W." went to Millersville, Penn., and attended the normal school for two years, working about the mines during vacation time. At the conclusion of this brief schooling, Morris secured a position on the engineering corps of the Lehigh & Wilkes-Barre Coal Co. near Hazelton, remaining with this latter concern four years.

While thus engaged in mastering the problems of coal engineering, Mr. Williams taught during spare hours, and in addition utilized all available minutes in reading law, it being his ambition at that time to become a lawyer.

The next move he made was to accept an engineering position with Major Stearns, one of the pioneers in the development of anthracite coal. This work provided him much valuable mining experience and occupied three years of his time. This stage of Morris Williams' life is of peculiar interest, as it shows how, "a person who resolves on any great end, has scaled the highest barriers to it." Deprived of a college training, he sought out an educated man (a clergyman by profession and occupation), and tutored under this instructor for three years, completing in that time, solely by night work, the practical equivalent of a university curriculum.

In 1885, Mr. Williams went West and engaged in metal mining, holding the position of superintendent of a gold mine in Wyoming. At the same time he busied himself with geological work in Colorado, having become associated with an engineer well versed in geological practice. This training has been of much benefit to him in overcoming many problems in the development of anthracite-coal seams.



MORRIS WILLIAMS

Following his sojourn in Wyoming and Colorado, he undertook some special examination work in Texas and Mexico, for the Texas & Pacific R.R. Co. This task completed, he returned to Pennsylvania, accepting a position at Shamokin as engineer for the Mineral Railway & Mining Co., a subsidiary of the Pennsylvania R.R. The year following, 1888, Morris Williams was made superintendent of the last mentioned company, and held this position until the year 1897, when he was made manager of the same concern, succeeding Major Stearns. In 1903, when General I. J. Wister resigned as head of the Pennsylvania R.R.'s combined coal interests, Mr. Williams was made president, and was saddled with the additional responsibility of looking after the selling, as well as the mining end of the business.

Morris Williams differs in one important respect from most men who have tasted the discomforts of hard manual labor—Frequently when an individual rises from the lowliest ranks, he becomes the worst kind of a czar, and seemingly forgets all the bitter happenings and unpleasant moments resulting to him from the autocratic inhuman treatment of petty officials. Not so with Morris, his heart and sympathies are with the fellow who is unfortunate enough to be toiling at the foot of the ladder. You don't have to appear before a notary and make affidavit that you are of sound mind and good character, before you can see the president of the Susquehanna Coal Co. It's this special point that has helped him to the top and endeared him to his subordinates.

After a short acquaintance with Mr. Williams, no doubt remains in your mind as to the one essential that has brought him success. The element in question is "persistence." He has never been known to turn back nor weaken when confronted by adversity. His idea is that persistency of purpose is power. That it creates confidence in others, and that everybody believes in the determined man. When such a person undertakes anything, his battle is half won, because not only himself, but everyone who knows him believes that he will accomplish whatever he sets out to do.

Concerning the question of individual industry, he attributes the greater part of human effort to compulsion from personal need. He would revise the old maxim to read—"Necessity is the mother of *industry*, as well as the mother of invention." His philosophy is that—"Nature masks her own ends in our wants, and this urges us onward over obstacles; that the Creator has concealed highest happiness and greatest good beneath sternest difficulties, and made their attainment conditional upon a struggle for existence."

Governor Tener, of Pennsylvania, recently appointed Mr. Williams to serve on the Pennsylvania Workman's Compensation Commission, and it is certain no more fortunate selection could have been made. The men in the Keystone state who work with their hands, and who have slight opportunity to lay aside a sufficient competence to tide them over difficulties, and provide for their families in case the worst may happen, have a friend in "M. W." who will champion their cause as though it were his very own. He is the type of man in whom reason will always maintain its empire over the mind, but in no case will cold facts so control his actions as to exclude sympathy and callous his heart to the needs of less fortunate humans.

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This journal has a direct aim—a single purpose—which is to help advance the coal-mining industry. Its creed embodies the dissemination of knowledge and the free interchange of ideas among its readers, all of whom are invited to become regular contributors.

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COAL AGE

The Flying Wedge

The British strike rapidly approaches an end. The opportunity, therefore, presents itself to sum up the teaching of this strike which has dealt such a heavy blow to Great Britain.

The suspension could have been made purely local had the miners of England so wished, but with a mixture of gallantry and brutal unthinking cruelty, the English miners concluded to make it otherwise. There was no need for such a long national strike, lasting as it did very nearly a month, for from the first, the greater part of the English operators were ready to concede a minimum wage.

The Scotch and Welsh operators resisted, and it was to aid them that the English miner refused to work. He prepared to enforce his demands by subjecting workers, many of them poorer and more unfortunate than himself, to the most grinding poverty that the pressure of public opinion and of a ministry dependent on his vote, might be compelled to take favorable action on the whole question. If it had not been for large contributions from the benevolent, and money raised by tax collections from those who were not actually concerned, the death rate would have been appalling. As it was, many honest people, too proud to accept succor, have been tortured as a result of the thoughtlessness of those who advocated a national strike.

The stand of the English miners has been described as noble, and indeed it had all the cruel gallantry of war. The Welsh operator was receiving about 85c. per ton more than the English. He was better able, therefore, in all probability, to pay a minimum wage, but he refused to pay it. In fact, it is usually the operator who is making the most money, who is best able to withstand pressure of that character. There was no need for the English miner to hold back from work, and he could have protected the public and subsidized the Welsh and Scotch miners and in the end would have realized a greater success. Instead, he preferred to grind the face of the poor, to pauperize the nation, to jeopardize its independence, when work was to be obtained under conditions against which he had no complaint.

Strange to say, the first men to endeavor to return to work were miners living in the counties where their demands were most strongly resisted. This suspension from labor, therefore, did not help the English miner, and it is easy to show that it did not hurt the operators in Wales or Scotland who refused to make any concessions. The suspension from labor of the English miner did not provide a means whereby the liberal operator might enter and seize the market of his rival. It did not help the Englishman to ward off his foreign competitor. It did not furnish the more generous coal owner a chance to profit by his generosity. It put a common penalty on friendliness, indifference and aggressive hostility.

But nevertheless, denying himself the exercise of his reason, John Bull concluded it was a gallant act because it involved a sacrifice. A certain Frenchman said of the charge at Balaklava, "C'est magnifique mais ce n'est pas la guerre," and the same may be said of the present situation—it was gallant, but it was not war.

In college days we thought the most effective move in football was made with the introduction of the "flying wedge," when the momentum of the whole force on the field flung itself on a weak spot of the opposing line. Its very effectiveness broke it up. Nothing could withstand the fierceness of the attack. Today, the miner adopts another and less effective mode of action. He would hurl his whole broadside against the united front of the operators, and make those who would concede, join battle with those who would not. He works valiantly to organize the employers to oppose labor and seems to find delight in penalizing the man who ventures to give him what he asks for.

There has been much opposition aroused to the existence of trusts and it is certain that they must be annihilated or regulated. So far, little has been done or said against a greater trust than any which has been prosecuted in the courts—a trust, open in its methods and almost entirely unrestrained in its actions. We refer to the labor trust. It has been permitted to exist because, the worker being weak, may be safely allowed some privileges denied to capital, which can so easily intrench, and because no human interest can well transcend the living needs of the working classes.

But there is a limit to the combinations of labor, and we think that limit approaches when it combines to refuse the offer of work made by those who concede its demands, when in order to show its strong, unrelenting power, and to paralyze the government, it combines to cease work. A combine to raise wages may be endured and condoned, but a combine to suppress the output when no stock is on hand and when the people must starve without the product, can hardly be described with a more fitting word than crime.

Did any trust ever refuse to sell the output of its mills or mines till *everyone* consented to pay its price, thus bringing ruin on those who were willing to meet its demands as well as on those who were not willing? Has it not been the practice of every great corporation, no matter how arrogant, to sell at any time to anybody who was willing and able to meet its stipulated schedule of charges?

The labor leaders would do well to conclude that their tactics are a violation of national and state laws, and of the absolute rights of the public, and to remember that the courts and people have long winked at labor combinations and pretended to find a distinction in principle where none really existed.

The judicial and legislative bodies have in this matter always had an eye to the defendant and decided that it was not well to compel him to observe a nice adherence to laws of unrestricted commerce because the defendant had too large an interest at stake to be rudely forgotten in the case at issue. But in a matter of paramount importance like that raised by the Britannic strike, if labor will not listen to reason, it must be made to pay heed to law.

Clearly the recent British strike was political, an attack not on the operators directly, but on them through the parliament of Great Britain. As such, it was not merely a restraint of trade—it was an act of treason. As evidence that the purpose was political, we would call attention to the fact that strikes to influence the government have been frequent across the narrow waters of the English channel.

To the great credit of the English workman be it said, however, that he preferred a passive resistance to wanton acts of "sabotage." But it must ever be remembered that Vandal acts of destruction are not so costly as acts of restriction and repression which silently but surely impoverish employer and employee, and bring the proudest people to a condition of mediocrity.

The Industrial Treadmill

We have scarcely yet learned that supply and demand do not regulate wages any more than they regulate the partition of Asian and African lands among the excessive populations of Europe. Wages are determined no longer by economic conditions; in fact, few things salable are any more so determined, both labor and material being controlled by trusts. Consequently there is often no fluctuation in the market prices to correspond with the changes in economic needs and prices for labor usually continue unaltered in an industry until a strike, realized or threatened, makes revision of labor prices necessary.

Such a revision is frequently the result of a change in the cost of the materials which the workingman has to purchase for his daily sustenance. But these materials usually cost more because some other workman has demanded a larger wage for the making or moving of them. So the relation of cause and effect is far-reaching, and frequently back of a needed reconstruction is a rise in the wages of some other artificer.

Thus every strike in an industry involves disorganization in another. Eventually all other industries emerge from the distressing experience with higher wages and an increased cost of product, be that product an actual material or its mere transportation. The cost of living is raised, and a new rearrangement must be made if the workers in the first industry are not to suffer.

Of course other considerations exist—trusts control charges for material, supplies of raw material dwindle or become larger from railroad extension, exploration and development, the stocks of gold vary and the volume of business transacted ebbs and flows. There are many variants, but the wage differential largely changes with these and is the most fluctuating factor of them all. If wages are only to be adjusted by strikes, then contests between labor and capital will frequently recur. A strike holds out an excellent prospect of reward, because the workingman who gets a substantial rise makes his fellow workmen pay more for his product while paying no more for theirs, and the way to succeed is to be learned from David Harum, "Do unto the other fellow as he would do unto you and do it first." The victory is not to the laggard or the unprotected.

Clearly all this is wrong, as bad for business as it is for the workingman. He is placed in an industrial treadmill. He lifts his foot to raise himself, the wheel of prices turns and he is promptly *in statu quo*. If the taking of the step were invigorating exercise, if it made him a happier man, it would be well. But the advance he makes on the treadwheel of industrial progress is taken in rancor and malice and followed by despair. It would be far better for all concerned if prices remained more uniform and wages rose less often, and it is certain that the workingman should receive automatically an increase of wage, proportional to any increase in living cost. If this could be arranged, strikes would be less frequent and when they occurred, would not have the popular appeal they now have.

When, under the present *régime*, a change of wages takes place, it is usually an arbitrary concession bearing reference to the change in prices in sign but not in quantity. Thus wages are raised inordinately and as such raises affect all skilled industries one by one, the cost of living becomes unduly advanced, and another violent labor readjustment is needed. That readjustment would possibly not have been necessary and would certainly have been less disturbing had the initial concessions been figured on a scientific basis.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Strong Roof and a Narrow Working

In answer to T. E. Richard's question on page 685, Mar. 2, I would say that controlling a mine squeeze is a difficult matter even under the most favorable circumstances. I would advise the driving of the last three rooms on the cross-entry to their limit, and the discontinuance of work on the parallel entry. I would then draw back the ribs of the three cross-entry rooms thus extended and at the same time the ribs of the last three rooms in the parallel entry.

I would then draw back the heading stumps and chain pillar as far as the mouth of the third room, taking care that no coal is left in any of the pillars, and that all props or posts are removed as far back as the retreating work is completed. What is wanted is that a sufficient area be taken out to cause a break. After that is secured all trouble is over. Crossbars will not prevent a squeeze nor will any other timbering. The weight will ride over all such supports until a break occurs. The line along which the pillars are worked is that of the best usage but the order followed in extending the rooms of the cross-entry is contrary to good practice. The rooms nearest the old mine should be started first, and the others progressively opened as occasion demands toward the main entry or flat. The line of fracture in the cross-entry should be maintained the same as in the parallel heading.

DAVID FULTON.

Marion, Ill.

Sealing Off Mine Fire in a Gassy Mine

I wish to state I have read with considerable interest the different letters submitted *re* the proper method of sealing off a mine fire that has gotten beyond control, rendering it practically impossible to fight it by the direct method. I have had considerable experience in fighting mine fires in gaseous mines, and have always advised the building of the first stopping on the return side. Although I am aware that this is practically impossible to do in some cases where conditions are adverse, yet I consider it well worth the effort if possible at all.

I have never experienced any explosion so far when the stoppings were built in this way. By closing the return side first, the products of combustion generated by the fire, which are principally extinctive gases, are confined to the region of the fire, enveloping it in a cloud of gases that are capable of rendering inexplosive the otherwise explosive gases that accumulate behind the stoppings, owing to the air being gradually cut off during their construction.

Moreover, the confined gases expanded by the heat of the fire will force back the fresh air and gases onto the intake, and eliminate the possibility of sealing up a large amount of fresh air and gas with the fire. I assume this is a gaseous mine; and unless the first stopping is built on the return side of the fire, these conditions are liable to cause a disastrous explosion.

I had the experience some years ago of seeing a stopping put in on the intake side first, in a very gaseous mine. The result was that, when the stopping was about three-fourths completed, there was a strong explosion, which blew down doors in the mine, and would, no doubt, have resulted in the death of the men engaged in building the stopping had it not been for the recoil that occurred at the downcast of the affected districts. This downcast, or air-and-water chute, was located about 2000 ft. beyond where the stopping was being built, and was very wet, as it was used to convey the ditch water of the upper workings that had been worked out, to the entry below, where it was pumped to the surface. The explosion recoiled at this point, owing to the reduction in temperature of the flame as it passed through the water chute, which was about 300 ft. long.

J. W. POWELL,
Mine Manager.

Coalmont, B. C., Canada.

Timbering a Mine Parting

I note in COAL AGE, March 23, p. 786, a question suggested for discussion by Noah Burton, Anglin, Ky., on the Best Method of Timbering a Mine Parting. Under the conditions named by Mr. Burton, I would suggest that no timber whatever be used as supports; and instead would advise the use of steel girders placed, say 18 in. apart, their ends being supported by walls of reinforced concrete of suitable thickness on either side of the parting. Old discarded mine rails cut in suitable lengths should be placed over the girders for lagging and any open space above these rails should be filled with débris. By adopting this plan of securing a mine parting the work is permanent and if properly executed will last for years. Then, again, if the job is worth doing at all, it is worth doing well.

Mine fires incident to heavily timbered partings are avoided, as is also the great risk of wrecked cars knocking out timbers and causing serious accidents and delays.

EDWIN HUSBAND.

Virginia Mine, Bessemer, Ala.

Thawing by Electricity

Referring to the question of thawing a frozen pipe line by means of a current of electricity, as mentioned on p. 586, COAL AGE, Feb. 10, and further discussed by Thomas Brennan, p. 785, Mar. 23, would say I have used electricity for thawing frozen pipes and believe it to be the quickest and cheapest means that can be employed. With direct current all that is needed is a source of supply consisting of a heavy power cable. To this attach a short length of a similar heavy cable, at the end of which is a bar of iron so arranged that it can be raised or lowered in a barrel of brine. At the bottom of the barrel is another bar of iron attached to the end of a heavy cable that serves to connect this bar with one end of the frozen section of pipe. The other end of the frozen section must have a return wire or be sufficiently grounded to insure a good current passing through the frozen section when the current is turned on.

The current-carrying capacity of the pipe must be less than that of the cable and the other wires in the circuit, so that the pipe will act as a resistance and become heated by the passing of the current. Practically, the heating effect of the current in the pipe line is regulated by raising or lowering the bar of iron suspended in the barrel of brine. The brine, in this case, acts as a water resistance and controls the strength of the current and, incidentally, the heating of the pipe. I have seen a half mile of frozen pipe thawed in five minutes, by this means. In *Engineering News* for Mar. 17, 1904, p. 251, are given data and description of an electric thawing apparatus used by several cities and towns.

F. D. BUFFUM.

Ellsworth, Penn.

Reducing Ventilation when Firing

With regard to R. Z. Virgin's remarks in COAL AGE, March 30, page 817, I would say that mining practice and measures for the protection of life, not of general application, must be determined in accordance with local conditions and requirements; and it may develop that a practice considered dangerous in Pennsylvania is a permissible and reasonably safe undertaking in Iowa. The Iowa mines do not generate explosive gas. The shots are fired after the miners have left the mine. The fan is slowed down while the shotfirers are at work and, at new mines, it is frequently stopped entirely. This practice has been in general use for the last ten years, surely a long enough test to bring out any drawbacks or dangerous consequences due to its use. So far, evidence showing the practice to be in any way unsafe has not been developed; while, on the other hand, satisfactory proof of its possible merits and benefits has been established and the practice has now the general approval of the operators, the miners and the shotfirers.

No claim was ever made that slowing down the fan at firing time would stop the occurrence of explosions entirely; but I have suggested the plan and adopted it as a fair makeshift and palliative to minimize the effect of an explosion, should one occur. Judging from the results, it appears that Iowa practice has proved at least as effective in this respect as sprinkling and spraying the dust. What few explosions have occurred in Iowa mines, in the last ten years, have shown comparatively little violence and were of small extent.

It should be understood that dust explosions, in their incipiency as well as in their propagation stage, can receive the necessary supply of air, under favorable conditions, without the aid of an artificially induced draft. In the absence of such favorable conditions, however, the inception of such an explosion depends largely on the assistance of a forced draft; and it is, therefore, evident that in all such cases the velocity of the air as determined by the speed of the ventilator becomes the controlling factor. This is not an opinion but a fact proved by the experiments of Mallard and LeChatelier that the velocity of the air current carrying the dust in suspension has a great influence on the degree of inflammability of the dust.

Mr. Virgin says: "I am of the opinion that slowing the fan increases the danger incident to firing shots." The facts, however, appear to sustain the opposite view. In experiment No. 11 at Altofts, the charge of dust was 400 pounds; in experiment No. 13 the charge of dust was 324 pounds, 76 pounds less. The charge of powder was the same in each case as were also the position of the cannon and the surrounding visible conditions were also identical. There was, however, a marked difference in the velocity of the air. In experiment No. 11 the recorded velocity was 655 ft. per min., while in experiment No. 13 it was 1219 ft. per min. Experiment No. 11 produced a rather mild explosion, doing no particular damage, while experiment No. 13, with a lesser charge of dust resulted in a most violent explosion, destroying part of the gallery, tearing up 43 ft. of the concrete floor and hurling the heavy valve, No. 9, a distance of 426 ft. If the difference in the velocity of the air was not the main cause of the discrepancy in results, what was the factor that brought it about? It will not do to say it just happened that way; for the results of explosions depend on and are determined by surrounding conditions. Like conditions should produce like effects. In the public tests made at the Pittsburg experimental station the results of these tests, which were repetitions of previous experiments, could have been accurately foretold, by those in charge, before the shot was fired in the gallery.

I believe in thorough and efficient ventilation of all mines, but I am not unqualifiedly, like Mr. Virgin, "a strong advocate of fresh air; the more the better, within reason." That has been the slogan of the English miner; for generations he was taught that the presence of a strong current of pure air meant added protection to him, at all times and under all conditions; and by his acts he has shown his implicit belief, even up to the present time, that a mine opening swept by a brisk air current was immune from explosions of any kind. Hundreds of lives have been lost through this mistaken belief, a fact supported by the statement in bulletin No. 425, of the Bureau of Mines, to the effect that "firing shots on the roadways (the reports show they were briskly ventilated when the firing was done) has been a frequent source of disaster in England." For example, the Altofts explosion in 1886, causing the death of 22 men and boys, took place on the principal intake airway 500 yd. from the downcast shaft. Along this airway a current of 40,000 cu.ft. of air per min. was passing. The Elemore explosion in which 28 lives were lost the same year, occurred on the principal intake airway 200 yd. from the downcast shaft. The amount of air passing through this airway was 37,800 cu.ft. per min.

Such instances should serve as a lesson and a warning that the evident beneficial effects of good mine ventilation should not be permitted to obscure the fact that a strong, fresh air current in a mine, although necessary and desirable, may be readily converted into a highly potential agency of destruction.

JOHN VERNER.

Chariton, Ia.

Timbering a Mine Parting

In answer to the question asked by Noah Burton, in regard to the best method of timbering a mine parting, COAL AGE, March 23, page 786, would say, my plan would be to cut into the coal on both sides of the track so that the legs of the timber frames can be set back in the rib, clear of the track, where they cannot be knocked out in case a car jumps the rail. The headers (crossbars) should then be set close to the roof. This is always a safe system to adopt in timbering partings, because a car cannot trip the timbers in case of a derailment or wreck. Such an accident has often caused the life of a man or a mule.

In case the roof stratum is soft and not very thick, it will generally pay better to take down the soft top to the solid. This work should always be in charge of an experienced mine boss, or timberman who understands the proper method of taking down roofs and timbering.

Red Ash, Va. A. T. WADE.

The Cambria Coal Field in Wyoming

The article by Mr. Simmons under the above title which appears in issue of COAL AGE of March 23, 1912, faithfully describes the principal features of the district and the mining conditions and peculiarities of the coal at Cambria, Wyoming.

Mr. Simmons is justified in giving much credit to the enterprise and energy of Kilpatrick Bros. & Collins in opening up and developing the field, for they deserve this credit and whatever profit they have been able to make in operating the property and in disposing of it to the present operating company.

EARLY WORK OF THE BURLINGTON

To those familiar with the conditions preceding and attending the development of this coal field, it will seem only right, however, that the matter should not be passed over without mention of the part played by Mr. Perkins, former president of the Chicago, Burlington and Quincy Railroad, and by Mr. George A. Holdredge, Manager of the Burlington and Missouri River Railroad which operated the C. B. & Q. lines West of the Missouri River; for it was only through the farsighted wisdom of these gentlemen, and of the Board of Directors of the C. B. & Q. R.R., that the development of this district was accomplished.

During the '80s, when the Burlington and other railroads were building feeders and spurs through the Dakotas, Nebraska and Kansas, gridironing the arable portion of those states with lines of rails, the fuel question began to loom up as one of serious import. This ap-

plied not only to the railways for steaming purposes, but to the rapidly growing population which followed the railroad extensions.

About 1885 the Burlington management began to canvass actively the country tributary to its lines for a suitable fuel supply, and extensive examinations were made of coal in Colorado and elsewhere. But the regions promising coal of suitable quality were not easily accessible and could not be reached except at large cost, involving the building and operation of many miles of railroad with heavy grades, and at high altitudes.

From the outset it had been the policy of the Burlington to confine its activities to those of a common carrier, and not to engage directly or indirectly in coal mining or other industries. But it had also definitely adopted a policy of encouraging the development of local industries, and this, together with its own pressing requirements for a fuel supply from mines on its own lines, naturally led to an arrangement, made some years later, whereby Kilpatrick Bros. & Collins agreed to supply the company with fuel from the mines at Cambria.

The First Explorations

In 1887, Kilpatrick Bros. & Collins, who as contractors, had built many miles of railroad for the Burlington, and who had earned the confidence of the Burlington officials, had their attention drawn to this region. Having determined to spend some money in trying to develop a workable coal they commenced at once to drive a drift in a seam about 4 ft. thick, which was parted at the center by a bed of hard sandstone about one and a half to two feet thick. About this time Mr. Perkins, at the suggestion of Mr. Holdrege, decided to have the whole region explored to learn whether there was any possibility of securing a railroad fuel supply from it, and doing nothing by halves, he decided to extend this exploration from the Black Hills on the Dakota-Wyoming line, westwardly across Wyoming to the Big Horn Mountains. It was of course already known that this was a region of great lignite and lignitic coal deposits, in which beds of great thickness extended over a very large area, but it was not known whether, in addition to the lignites, there might not be some areas or some beds which would yield coal suitable for railway fuel.

I was engaged by the Burlington, to make this exploration, and to advise Kilpatrick Bros. & Collins in the development of the Black Hills region, or other localities where I might advise them to do development work, and I made the first examination in the fall or early winter of 1887. At that time the coal at Cambria was unknown, and the coal at the opening above described being unworkable, I advised them to explore the canons cutting the plateau to the north and east, at the same geological horizon, to see whether an area could not be found in which the coal was workable. A camp was accordingly established and the work entrusted to Mr. Frank Mondell, then an employee of Kilpatrick Bros. & Collins. In this work Mr. Mondell demonstrated the ability which in later years has caused his election and re-election to represent this district in Congress.

Congressman Mondell—Prospector

Mr. Mondell's work resulted in the discovery of the coal where it is now worked at Cambria. His work was at first greatly hampered because along the outcrop and often for a distance of 30 to 100 ft. under cover the coal had been burnt, and the search for coal smut became a search for coal ashes.

Before this condition was discovered and recognized, the exploratory work was most discouraging, long distances along the place where the outcrop should have been found showing no traces of coal, or coal smut, until we learned to look for ashes and not for a coal smut.

Under Mr. Mondell's management, during the summer of 1888, a considerable area of workable coal was proven by drifts driven in on the outcrop in the canons, and by diamond drill holes bored from the surface of the plateau. I was able to report to the Burlington officials that there was practically proven or assured by this work some 12,000,000 tons (if my memory is not at fault) of workable coal of a quality suitable for locomotive use.

The incidents leading up to and following the development of this operation furnish a most interesting example of the part often played by railway corporations and the officials of such corporations, in the opening up of our country to settlement and of the development of its resources. History has since demonstrated the wisdom of the officials of the Burlington in this, and in other directions, as evidenced by the subsequent large enhancement in the value of its securities, and the cordial relations which always have existed between it and the communities which the railroad serves.

I heartily agree with Mr. Simmons' eulogy of Kilpatrick Brothers and Collins and cordially endorse his tribute to their energy and enterprise and to their record as whole souled fellows who never do anything without doing it well. But I think it would be a grave injustice to the officials of the Burlington to permit this matter to pass into history without recording the part played by them in the development of this coal field, and other enterprises in districts tributary to the lines of that company.

H. M. Chance,
Consulting Engineer.
Philadelphia, Penn.

A Successful Type of Rotary Dump

Referring to the article by Mr. Lindrooth, "A Successful Type of Rotary Dump," in Coal Age of Mar. 16, I wish to call attention to the fact that the idea of this dump had its origin in the fertile brain of the late Richard Ramsey, of Braceville, Ill., the inventor of the first box-car loader. His dump was double, the empty car being returned to position by the next load. This dispensed with the back balance, but required a deeper hopper for clearance and caused some breakage of the coal.

In 1897, with Mr. Ramsey's permission, I used his idea in perfecting a dump like the one shown in your paper, and installed three of them for coal and rock cars at our No. 3 mine, in 1898. They remained in service until the mine was abandoned in 1909. Again, in 1904, two more were installed at our No. 6 mine, and are in use today, handling the output of coal and rock successfully. They are the simplest cross-over dumps in use, and in no case have they cost us a dollar for repairs.

We adopted the closed-end car with this dump in 1898. We also adopted the practice of forcing the mine-car wheels onto the axles and thus got rid of the two abominations on pit cars, loose doors and loose wheels, at the same time.

W. Harkes,
General Superintendent, Big Four Wilmington Coal Co., Coal City, Ill.

Preparing Shot Holes

With reference to the question of securing maximum efficiency in firing permissible powders, I desire to say that the charging density and disruptive effects of permissible explosive cartridges may be greatly increased, when the cartridge is smaller in diameter than the drill hole, by slitting them lengthwise and tamping tightly into the holes. Air spacing will give slow action. This is done by placing a plug of tough, soft clay between the explosive and the stemming, and when doing this great care must be taken to tamp firmly the remainder of the stemming. This practice reduces the charging density and the explosive force may be regulated to suit the coal being blasted. Wooden rods which fit snugly into the drill holes should always be used for tamping bars. Tamp the stemming loosely near the explosive and tightly for rest of hole.

Pittsburg, Penn. A. M. C.

Colliery Notes and Comments

Practical hints gathered here and there, and condensed to suit the busy reader

During the year 1910 Nova Scotia shipped $368,146 worth of coal to the United States.

A 3-in. layer of portland cement mortar applied on expanded metal lathe is a good protection for coal bins.

The transmitting lines of electrically driven fans should be independent of trolley lines so that any trouble with the trolley system will not interfere with the ventilation.

Good air-tight stoppings, costing about one-third as much as brick stoppings, may be constructed of "Burkett' lath, plastered with wood fiber, mixed with an equal quantity of sand.

In designing a pumping plant for a mine the capacity of the pump should be 2½ times the amount of water to be handled. The sump of such a plant should accommodate an accumulation of from 36 to 48 hours.

Adjustable loading-booms for loading railroad cars at the breaker are a great factor in the elimination of breakage. When an empty car is being filled the boom is close to the bottom and rises gradually as the car fills.

Experiments have shown, that within certain limits, the strength of mine props is independent of their length. A fairly straight, medium-length prop should be able to withstand a pressure of one ton per square inch of small-end area before crushing.

Wooden mine cars should have their sides and ends built of tongued and grooved boards to prevent the dropping of dust on the roadways. The bottom should be lined with sheet iron for the same reason and this prevents damage while loading; furthermore, it also greatly facilitates dumping, as the coal slides easily from the sheet-iron surface.

The Prussian Firedamp Commission has estimated that from 10 to 13 ft. of flame result from a blownout shot of half a pound of gunpowder in a non-gaseous atmosphere when the hole is stemmed with clay. Where stone and coal dust are used for stemming the flame increases to 16 ft. A pure coal dust stemming results in a flame from 31 to 52 ft. long.

In the coal mines of Durham and Northumberland, England, chambers are not arbitrarily awarded the miners, but they are allowed to draw lots for the same, which gives every man an equal chance of securing the best chamber, thus safeguarding the men's rights. These drawings take place every three months. Each district or colliery adopts rules for the drawing suitable to local conditions.

For fighting fires in the pitching breasts of the anthracite mines, elecric fire-fighting cars are sometimes used. They consist of a truck equipped with an electric pump, hose, insulated wire, fire-extinguishers, axes, saw, hatchet and a first aid supply-box. These cars can be run to any point in the mine which is tracked and a stream of water, drawn from the mine ditch, directed against the fire within a short space of time.

According to the *Engineering and Mining Journal,* the comparative fuel cost at the Port Henry, N. Y., power plant is as follows: 11 tons of No. 2 buckwheat (anthracite) worth $2.65 per ton at the plant, is equal in heating value to 10 tons of bituminous, at $3.92 per ton, or $29.15 worth of anthracite equals $39.20 worth of bituminous coal, thus making the cost of operating with bituminous 1.345 times more than for anthracite.

Some European methods of testing mine ventilation are: (1) The Liveling principle, based on the fact that platinum burns with a brighter glow when CH_4 is present than it does in pure air. (2) The Shaw method, which consists of adding pure CH_4 to a mixture until the explosive point is reached; the difference between the amount added and the amount necessary to produce an explosion is the amount of gas held in the ventilating current.

In working thick seams of coal with several partings the question of impurities in the coal is of great importance. Where the partings are thick, and the coal mined by machine, the amount of impurities may be reduced to a minimum, but where the partings are thin, and the coal shot from the solid, the presence of more or less bone and slate in the mined coal is unavoidable. When a large output has to be handled by one tipple, it is best to remove as much as possible of the impurities at the working face, because the dumping must be done too quickly to permit much inspection.

To fix pencil lines on drawings, rub the drawing with a piece of wax like that used in the manufacture of phonographic rolls. This produces a kind of varnish which protects the lines against rubbing and insures their preservation. Paper as well as tracing cloth can be protected in this manner. Another method is to heat the paper slightly before using it, then spread a solution of warm alcohol and bleached colophone rapidly over the surface so as to thoroughly wet it, after which it is to be dried in warm air. The pencil works easily on the surface of paper so prepared. In order to fix the lines, it is merely necessary to reheat the paper slightly for a few moments. The lines are then covered with a thin coating of transparent varnish, which preserves them in perfect clearness.

To clear firedamp from mine workings provide a liberal volume of air properly conducted to the working faces. Where poor ventilation has allowed a large body of gas to accumulate it should be removed gradually, in sections, as by this method the gas is more easily broken up and the return current does not become so gaseous as when the air current is turned into the whole body of gas. While this is being done withdraw all men from the dangerous parts of the mine and the return side of the gas body. See that only careful, competent men, supplied with a good type of locked safety lamp are employed in the work. Take good care to fix all brattices or air pipes on the intake side and to keep all safety lamps away from the accumulation of gas near the floor. Provide an abundant supply of timber, brattices, lathes, nails and pipes.

The conditions which wiring systems have to withstand in mining work are peculiar and often severe. Everything used in a mine must be designed to endure rough and unskilled handling, and of a nature capable of resisting corrosive and abundant pit water. Sparking must be avoided, or at least confined. Efficient grounding is not easy to effect. Wall and roof movements occur. Extensions of electrical wiring are of almost weekly occurrence, and these have often to be carried out quickly and in a bad light. Dangers from shock are increased, owing to confined space and to working conditions which lower the electrical and vital resistances of the workers. When these special conditions are not studied in design, D. S. Munro is correct in assuming that electricity, which ought to be the safest carrier of power and light, may be actually more dangerous, and, because of unfamiliarity, more dreaded than older methods.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Interesting Questions Selected from Various Recent Examinations

Capacity of Pump To Drain Shaft

Ques.—In the course of sinking a shaft, a feeder of water was met when a porous sandstone was struck. The water rose 300 ft. in the shaft. A pump having a capacity of 300 gal. per min. failed to lower the water more than 62 ft. What would be the capacity of a pump capable of draining this shaft?

Ans.—Assuming that the height to which the water rose in the shaft (300 ft.) represents the natural head of the feeder in the strata, and that the flow increases as the water level is lowered in the shaft, in proportion to the square root of the effective head, we have the ratio of the flow, in gallons per minute, is equal to the square root of the ratio of the corresponding head, in feet.

Therefore, if the flow is 300 gal. per min. under a head of 62 ft. the question is what would be the quantity of the flow for a head of 300 ft., or when the shaft was completely drained. To be safe, call this head 310 ft., which gives round figures. Then, calling the required capacity of the pump, for this head, x,

$$\frac{x}{300} = \sqrt{\frac{310}{62}} = \sqrt{5}$$

$$x = 300\sqrt{5} = 670 + \textit{gal. per min.}$$

Horsepower Required to Hoist Coal

Ques.—What horsepower will be required to hoist 1200 tons of coal up a shaft 525 ft. deep, in 8 hr., allowing 12.5 per cent. for the resistance of rope, pulleys, etc.

Ans.—Adding 12.5 per cent. or ⅛ of the load hoisted to allow for friction the load including friction is

$$1200 + \frac{1200}{8} = 1350 \textit{ tons}$$

Practically, a certain time should be allowed for unavoidable delays, say 5 per cent., making the actual time of hoisting $8 \times 0.95 = 7.6$ hr. each day. But, since it is necessary to calculate the horsepower on the maximum speed in hoisting, and since about one-half the actual time of hoisting is lost in dumping or changing cars between trips and starting and stopping trips, the time of hoisting the full depth of the shaft at such speed might be taken approximately, in this case, as

$$\frac{7.6 \times 60}{2} = 228 \textit{ min.}$$

To do this would require

$$H = \frac{1350 \times 2000 \times 525}{228 \times 33{,}000} = 188 + hp.$$

[The theoretical horsepower, making only the given allowance for friction, and not allowing for loss of time, in delays, changing cars and starting and stopping trips would fall short in actual practice. This theoretical power would be

$$H = \frac{1350 \times 2000 \times 525}{8 \times 60 \times 33{,}000} = 89.5 \textit{ hp.}$$

In actual practice more data are required to make this calculation with accuracy, in order to determine the load per hoist and the necessary maximum speed of hoisting. In the above we have assumed a balanced hoist and ignored the weight of the rope hanging in the shaft.]

Discharge of Siphon

Ques.—In a siphon pipe line 4 in. in diameter and 1760 ft. long, the greatest altitude of the pipe is 15 ft. above the intake end and 52 ft. above the discharge end. How many gallons of water will this siphon discharge in 1 hr.?

Ans.—The lengths of the two arms of the siphon are not given, but only the total length of the pipe. Therefore, assuming that these respective lengths are such that the intake end, under atmospheric pressure, will supply the discharge end, which flows under gravity, the quantity of water discharged per hour will be

$$G = 60 \times 4^2 \sqrt{\frac{52 - 15}{\frac{1760}{800 \times 4} + 0.0026}} = 7852 + \textit{gal.}$$

Pressure Due to Blasting

Ques.—Give the pressure per square inch on the tamping when 6 lb. of F F powder is exploded in a 3-in. drill hole, in blasting coal.

Ans.—Black blasting powder yields on explosion 360 times its volume of gases, measured at 32° F., barometer 29.92 in. and a solid residue of ⅓ the volume of the powder exploded. When the powder is exploded in a drill hole or other confined space the 360 volumes of gases are crowded into a space that is ⅔ of the original volume of the powder, owing to the solid residue that fills the remaining ⅓ of the original space occupied by the powder. This is equivalent to

$$360 \times \frac{3}{2} = 480 \textit{ volumes}$$

of gas filling the entire space occupied by the powder, or 480 times the volume of the powder; and increases the pressure 480 times the original pressure, which was 14.7 lb. per sq.in.

The pressure at the moment of explosion, however, is very much increased by the rise of temperature due to the combustion of the powder. The theoretical temperature due to the explosion of black blasting powder is 3600° F.; but to obtain this high temperature the combustion must be complete in an instant of time, which is not the case. Black powder burns at a comparatively slow rate, depending on the size of the grain and quality and hardness of the powder. Much of the heat developed is radiated and lost before the combustion is complete. On this account, the temperature in the drill hole, in blasting coal, rarely exceeds 2000° F., in good practice.

This makes the pressure due to the explosion of black blasting powder, in a drill hole, at sea level,

$$\frac{14.7 \times 480}{2000} \times \frac{460 + 2000}{460 + 32} =$$

$$\frac{14.7 \times 480 \times 2460}{492 \times 2000} = 17.64 \textit{ tons per sq.in.}$$

The question asks for the pressure per square inch exerted on the tamping by the explosion of a given weight of powder. The pressure per square inch does not depend on the weight of powder exploded or the size of the hole. It varies with the elevation above sea level.

Pumping Calculation

Ques.—(a) What is the cylinder displacement and theoretical discharge of a pump whose water cylinder is 12 in. in diameter and length of stroke 16 in. when making 90 strokes per min.? (b) Assuming an efficiency of 85 per cent. for the water end of this pump, what is the actual discharge?

Ans.—(a) The piston speed in this case is

$$S = \frac{16 \times 90}{12} = 120 \textit{ ft. per min.}$$

Piston displacement,

$$120\left(\frac{0.7854 \times 12^2}{144}\right) = 94.248 \textit{ cu.ft. per min}$$

Theoretical discharge,

$$\frac{94.248 \times 1728}{231} = 705 \textit{ gal. per min.}$$

(b) Actual discharge,

$$G = \frac{705}{0.85} = 828 \textit{ gal. per min.}$$

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

The proposed repeal of the Canadian reciprocity act, which has been urged by the Senate committee on finance, in a report rendered within the past few days, is being opposed by President Taft, who expresses the hope and belief that it may still be possible to obtain an adjustment with Canada later on, when that country has had time to reconsider the question of closer trade relations with the United States.

One of the items, in regard to which it is especially desired that there shall be no change so far as the act is concerned, is that embracing coal and slack. For these commodities, a substantial reduction had been arranged in the bill, which was rejected at the polls in Canada last autumn. It is the opinion of the President's advisers that these items are particularly likely to serve as a useful basis for negotiations in the future, and that to repeal the bill now would leave the President without the possibility of authority to include them in a treaty with Canada, should conditions later favor such action.

It is said that in all probability the Ways and Means committee at the next Congress, if the Democrats continue in power, will report a bill in which the President will be given authority to negotiate treaties of reciprocity with foreign countries on a distinctly lower basis of rates than that which prevails in the general tariff, and it is understood that coal will be one of the items on which the Democrats will establish the lower schedule of rates which is to be offered in the proposed bill. It is believed that a large trade in coal may be developed with the aid of the Panama Canal if conditions are made moderately favorable, by securing the abolition of duties in foreign countries through holding out of sufficient inducements in the way of reductions of duty on articles imported into the United States.

Coal Strike Legislation

A general understanding has been reached apparently, to the effect that in the absence of any new and more threatening developments in connection with the impending coal strike, there probably will be no further action taken with respect to the Lee and Townsend bills, providing for an extension of the Erdman act to apply to strikes in the coal industry. Neither does it at present seem likely that any substitute provisions of like character will be taken up. The bills will be left in committee.

If any step of the sort is taken at this session of Congress, it will probably be the reporting and possible passage of a modified form of the Foster bill to create a Commission on Mining Industry. This bill provides that a commission shall be created as follows:

> Said commission shall be composed of 11 persons, to be appointed as follows: Two members of the Senate (including the chairman of the Committee on Mines and Mining and one member to be appointed by the President of the Senate), two members of the House of Representatives (including the chairman of the Committee on Mines and Mining and one member to be appointed by the Speaker of the House), two representatives of mine operators, two representatives of miners, two mining engineers and one representative of the Bureau of Mines, to be appointed by the President of the United States.

Duties of the Commission

The portion of the bill which applies especially to the coal industry is as follows:

> The commission shall inquire into the general condition of labor employed in the mining industry of the United States, and especially as to the safety of mining and the methods of more efficient mining and the conservation of the mineral products of the United States; into existing relations between employers and employees; into the growth of associations of employers and of wage earners and the effect of such associations upon the relations between employers and employees; into any methods which have been tried in any state or in foreign countries for maintaining mutually satisfactory relations between employees and employers; into methods for avoiding or adjusting labor disputes through peaceful and conciliatory mediation and negotiations; and into the scope and methods and resources of existing bureaus of labor and of mines and into possible ways of increasing their usefulness so far as the mining industry is concerned. The commission shall seek to discover and to point out the underlying causes of dissatisfaction in the mining situation.

Alabama

Birmingham—It has been announced that the Sloss-Sheffield Steel & Iron Co. has agreed to pay the State of Alabama 45c. per ton for coal mined by the convicts employed by the company. This is an increase of 2½c. per ton over the terms of the original contract. The agreement between Gov. O'Neal and officials of the Sloss-Sheffield company was reached only after several conferences on the subject had been held.

Corey—The Tennessee Coal, Iron & Railroad Co. has fired the second battery of its new Koppers byproduct coke-oven plant. This battery of 70 ovens marks the completion of one-half of the large plant now under construction. It is expected that the two remaining batteries and the balance of the plant will be finished by June 1 of this year.

Colorado

Trinidad—After a conference of coal operators of Las Animas, Huerfano and Fremont Counties, the mine employees were allowed a substantial increase in wages, taking effect Apr. 1. Miners will receive an increase of 5c. per ton, run-of-mine, and all other classes of labor will receive a corresponding increase. More than 12,000 men are affected by the increase and these are scattered among the 100 mines at present in operation in the district. The operating companies have decided to increase the price of coal 10c. per ton, so the consumer, and not the companies, will really have to pay the advance. The Colorado Fuel & Iron and the Victor-American Fuel companies took the initiative in the movement. The other companies which agreed to the increase are the Rocky Mountain Fuel Co., the National Fuel Co. and the Consolidated Coal & Coke Co. Small Independent operators are expected to follow the action of the big companies.

Illinois

Peoria—The Peoria District Collieries Co. and the Western Coal Sales Co., two local concerns, were recently incorporated for the purpose of mining and selling coal. The present capitalization of these companies is small, but it is understood their capital will be considerably increased later. The Collieries company will operate the Scholl mines at Bartonville.

Streator—All the properties of the Star Coal Co., of Streator, have passed into the hands of a new company, to be known as the Star Coal Co. of Galesburg. The new company is capitalized at $51,000 with Thomas Fairbain as president. The properties include three mines at Cuba, ordinarily employing about 400 men, and one mine at Fiatt, which has been closed since Dec. 1. The Fairbain

interests own other coal operations in this locality. All the properties lie along the Burlington railroad, about 25 miles south of Galesburg.

Springfield—About 7350 men are idle in Sangamon County and 36 mines shut down during the suspension. Four thousand residents of Springfield alone are temporarily out of employment.

Chicago—Within a month or six weeks, the Chicago & North Western R.R. will begin the construction of its projected line from Peoria, Ill., to a connection with the Macoupin County Ry., a proprietary company, near Girard, in the south central portion of the state. The new line will give the North Western direct access to its extensive coal fields in southern Illinois. At present, this territory is reached over the Chicago & Alton.

Harrisburg—The last semi-monthly pay day for a number of mines in this vicinity was without doubt one of the largest in the history of the field. The O'Gara Coal Co. disbursed about $130,000, while the Saline County Coal Co. and the Wasson Coal Co. paid out practically $50,000 more.

Kewanee—The Kewanee Coal Co., which has been prospecting for some time on its property two miles east of here, recently encountered a 32-in. seam of coal, at a depth of 275 ft. This is known as the No. 3 or Spring Valley seam. Further drilling will be carried on in order to determine whether or not mining operations are likely to prove practicable.

Indiana

Indianapolis—Except for pumpers and other men employed to keep the properties in shape, the bituminous coal mines of Indiana are deserted and will remain idle until the 20,000 miners receive notice that the wage contract, agreed to in Cleveland, has been ratified by a referendum vote.

Brazil—The block coal and clay mines operated in connection with clay factories in Indiana will continue to work pending a settlement of the wage controversy by referendum vote of the miners, according to action taken by the official board of the Indiana Mine Workers. Some of the factories have their own mines for the production of coal. Their output is not sold elsewhere, and the miners' officials decided to allow these mines to continue in operation during the suspension. The factory owners have agreed to pay the mine employees according to the proposed scale. The most radical change in the local block-coal agreement will be the weekly pay to succeed the semi-monthly pay, a change which will be welcomed by miners and merchants.

Evansville—Following an agreement between Indiana miners and operators, two Evansville railroad mines are continuing to work during the general suspension with the understanding that in the meantime the miners will receive the new scale, or in event of failure to settle on a scale, will receive the rates that their officials have demanded.

Kentucky

Louisville—The operators and miners of western Kentucky were in conference here for five days before the miners drew up a proposition that the operators indicated a willingness to accept. The principal departure made by the miners from the Cleveland agreement concerns the percentage of lump coal in the run-of-mine product. This has heretofore been estimated at 62 per cent., but the miners now demand that in paying the men on a "run-of-mine" basis, allowance be made for the presence of 74.25 per cent. of lump coal. Inasmuch as the Cleveland agreement provides for an increase of 5c. per ton for lump coal (pick mined) and 3c. per ton for "run-of-mine," it can be seen that if the pay of the men were based on an estimate of 74.25 per cent. of lump coal, instead of 62 per cent., the effect would be a further increase over the Cleveland scale. The demands of the men, if granted, will establish a scale in the western Kentucky district of 92½c. per ton for lump coal and 67½c. per ton for "run-of-mine coal. The scale demanded for workmen paid by the day is as follows:

Tracklayers, $2.46; trappers, 75c.; bottom cagers, $2.23; drivers gathering with one mule, $2.46; drivers gathering with two mules or more, $2.67; riders, $2.23; water haulers, $2.23; timbermen, $2.46; pipemen, $2.36; all other inside day laborers, $2.23. For outside work the minimum is fixed at $2 a day. For blacksmiths a minimum of 33c. an hour is asked; for engineers, 35c.; for firemen, 32c.; for night watchmen, $2.23.

The demand that the percentage of lump be raised from 62 per cent. to 74.25 per cent. was qualified by an alternative proposition from the operators that if it be refused an actual test be made to determine the exact percentage.

Montana

Butte—The Trail Creek coal mines, which were closed down Apr. 1, throwing 300 men out of work, will be opened again immediately, as arrangements have been made with the Northern Pacific to operate the branch railway from the mines to the main line of the railroad.

Orders have been received from B. B. Thayer to close down the coal mines of the Anaconda Copper Co. These mines have been in operation 17 years and employ 216 men.

Bozeman—There is a persistent rumor current in this city to the effect that the Chestnut mines, near here, will be shut down indefinitely. The mines have been running on short schedule for several years. The property is owned and operated by the Northwestern Improvement Co.

Missouri

Kansas City—Coal operators of Kansas, Missouri, Oklahoma and Arkansas met here, Apr. 5, to outline a proposition to be submitted to the United Mine workers of America, at a joint conference, to be held Apr. 8, when an effort will be made to renew the two-year contract that expired Apr. 1. The mines in the Southwest will remain in operation pending negotiations.

Ohio

Columbus—Operators in Ohio expect little difficulty in the adjustment of a mining scale. Some believe that a fortnight's suspension is all that will be necessary, while others think that it may require 30 days to work out the difficulties. Secretary and Treasurer G. W. Savage, of the Ohio division of the United Mine Workers is confident that the referendum vote will be favorable to the ratification of the wage scale. He believes the result in Ohio should be known by Apr. 15. Ballots for the referendum vote have already been sent out. One of the effects of closing down the Ohio mines will be the release of a large number of cars to the West Virginia fields. Operators in West Virginia have been running with a short-order supply for a good many weeks. As soon as the Ohio operators are able to resume work, a large tonnage will be rushed to Lake points and loaded to wait the opening of navigation. It is believed that, owing to the severe winter, navigation cannot be opened until about the middle of May.

St. Clairsville—The transfer of the property of the Rail & River Coal Co., of Pittsburg, to the Grand Trunk R.R., was made here, Mar. 30. The property lies in the southeastern part of Belmont County, and includes three producing mines in the Pittsburg No. 8 seam of coal, mining equipment and 30,000 acres of coal lands. The Rail & River Coal Co. is capitalized at $250,000.

New Philadelphia—Jeremiah E. Reeves has sued the James Mullins Coal Co., one of the largest coal operators in Tuscarawas County, for $38,000 damages, alleged to have been done to Reeves' coal land in the three years' time that the Mullins company leased it. More than 30 charges of carelessness by the defendants are made in the petition.

The property of the Dennison Mining Co., including 550 acres of coal land in Tuscarawas County, will be sold at public auction, Apr. 29, to satisfy the claims of the Union Trust Co., of Pittsburg, Penn.

Oklahoma

McAlester—It was announced here, Apr. 1, that the miners of the southwestern district would remain at work during the adjustment of a new wage scale. About 1500 miners in this locality are affected.

Pennsylvania

BITUMINOUS

Pittsburg—Coal miners throughout western Pennsylvania will remain idle until Monday, Apr. 22, rounding out a three weeks' suspension in accordance with the decision reached Apr. 3, at the convention of district No. 5, United Mine Workers. The delegates decided to await the result of the international referendum vote to be tabulated Apr. 20. The Mercer-Butler-Armstrong field will be excepted, the men continuing at work with the companies paying the increased wages. There was a general agreement that the Cleveland wage-scale compromise would be approved.

Greensburg—Following the announcement of a wage increase at the various workings of the H. C. Frick Coke Co., other leading coal companies in Westmoreland, Fayette, Washington, Somerset, Cambria, Green and Clearfield counties, have taken similar action. The majority of the employees of these concerns are not affiliated with the miners' organization. Among the companies who have agreed to pay their employees an increase in wages averaging 7½ per cent. are the Jamison Coal & Coke Co., the Keystone Coal & Coke Co., Berwind-White Coal Co., United States Coal Co., Penn Gas Coal Co., Westmoreland Coal Co., Consolidation Coal Co., Quemahoning Coal Co., Somerset Coal Co., Pennsylvania Coal Co., Clearfield Coal Co., Rembrandt Peale Corporation, Peerless Coal & Coke Co., Somerset Coal Co. and over a hundred minor coal companies in the southwestern section of the state.

Uniontown—The W. J. Rainey Coke Co., one of the largest independent producers of the region, recently announced that it would install bath tubs, shower baths and other modern conveniences in all its houses occupied by employees. This is an innovation in the coke region. The company also is making about $100,000 worth of improvements to its plants.

Dubois—By a vote of 91 to 69 the delegates representing 40,000 miners of district No. 2, United Mine Workers, decided, Apr. 3, to accept the recommendation of District President Gilday, and continue working until Apr. 15. If a scale agreeable to the miners is framed in the meantime, work will continue without interruption.

Butler—The coroner's jury which investigated the boiler explosion at the mine of the Turner Coal Co. at Evans City on Mar. 23, when five men were seriously burned, one fatally, found the company guilty of negligence. Charged with neglect of duty, L. B. Gaiser, superintendent of the mine, waived a hearing and was bound over to court in $500 bail, furnished by the company.

ANTHRACITE

Scranton—The suspension of operations in this region and around Carbondale is practically complete. Several washeries belonging to the D. L. & W. and D. & H. companies have been kept running to supply boiler fuel, although the mine workers declare their intention of calling out the men and making an effort to close down all washeries. The Oxford mine of the Peoples Coal Co. recently suspended operations to install a gasoline motor haulage system but is expected to keep going during the suspension just as it did in 1902. A number of small independent mine owners are trying to make arrangements to keep operating in order to supply the local trade. Miners employed at the Jermyn colliery at Old Forge are staying away from work, notwithstanding the fact that they have been offered a 10 per cent. increase in wages and any other concessions the operators in general may ultimately grant. No violence has been reported in this region and the guards formerly hired for times like this are not in evidence.

Wilkes-Barre—Recognition of the miners' union is being brought more and more prominently forward as an issue in the present controversy, independent of an increase in wages. At a recent meeting of a thousand miners at Nanticoke, it was strongly declared that they would not accept an increase in pay unless accompanied by recognition of the union.

The West End Coal Co. at Mocanaqua and the W. T. Payne Co. at Luzerne are keeping their washeries running and are shipping coal. The only steps taken to oppose this activity consisted in calling out the union men employed at the plants.

Hazleton—While peace has prevailed generally throughout the coal fields, there was recently an instance of violence at McAdoo, near here. A fireboss, employed in one of the collieries, was probably fatally injured in a fight, the direct outcome of the suspension.

Pottsville—None of the collieries in the Schuylkill region are working. The plants of the Philadelphia & Reading company had steam up, ready for work, Apr. 2, but no men reported. It is not expected that an effort will be made by any of the collieries to work until after the Philadelphia conference, on Apr. 10, although several individual operators claim that they can get enough men to work their plants whenever they make the attempt.

Shamokin—An attempt of the operators to open the Kathryn colliery, Apr. 3, failed, because members of the union personally persuaded all the men who reported for work to go back home. The company officials say they will try again. That the Reading company expects the trouble to be drawn out was indicated recently, when it ordered all of the mules hoisted from the Henry Clay shaft. The district is absolutely quiet.

West Virginia

Charleston—The 30,000 miners of the Kanawha district received notice from their officials, Apr. 1, that they might resume work pending settlement of the final details of the Cleveland scale, because their markets were threatened by the nonunion districts of the state. The policy committee of the United Mine Workers, at its Cleveland meeting, gave this privilege.

The Charleston-Kanawha Coal Co., incorporated recently and backed by Pittsburg capital, has taken over the coal underlying about 60,000 acres in the Kanawha field, immediately in the neighborhood of Charleston. Development will begin shortly and the operations are expected to become among the largest in the state.

Pocahontas—The Pocahontas Consolidated Collieries Co. has recently purchased the lease and properties of the Cirrhus Coal & Coke Co., for about $107,000. This property is at Big Four, W. Va. Both the No. 3 and No. 4 Pocahontas beds are being mined.

Heavy rains in the Pocahontas field recently, have caused much damage and delay of operations. Two mines were completely flooded, and there were 20 landslides along the Norfolk & Western Ry., between Vivian and Williamson.

Elkins—The mines of the Davis Colliery Co., at Junior, have resumed operations after a shutdown of 13 months.

Welch—At the request of the relief committee of the Red Cross Society, Governor Glasscock, on Apr. 3, issued an appeal for aid for the sufferers from the recent mine disaster at Jed.

England

London—The miners' federation, following a long session, Apr. 6, officially declared off the great coal strike, and ordered the men to return to work immediately. If the surface men's grievances can be settled, there seems to be nothing to prevent a resumption of work throughout the coal fields. The protests of the Yorkshire and Fifeshire miners against the decision of the Miners' Federation are not likely to be followed by action. The miners' associations of these counties have already recommended the men to return to work. General activity prevails in all the coal-mining districts.

Personals

Edward H. Coxe, of Birmingham, Ala., has resigned his position as general superintendent of the coal mines and coke ovens of the Tennessee Coal, Iron & R.R. Co., effective June 1, 1912.

C. C. Anderson, general superintendent of the Northwestern Improvement Co., and E. M. Cortright, engineer of the Montana Coal & Iron Co., have recently been elected members of the Montana Society of Engineers.

Howard Elliott, president of the Northern Pacific R.R., in company with a number of the railroad's officials, recently inspected the coal properties of the Northwestern Improvement Co. in the vicinity of Red Lodge, Montana.

John L. Collin has obtained passports to France and Italy. As a representative of the Pittsburg-Buffalo Co., of Pittsburg, he will sail at once for France to negotiate the sale of a large quantity of coal to the French government.

William H. Grady has resigned his position as chief engineer of the coal mines of the Tennessee Coal, Iron & R.R. Co., effective Apr. 1. C. G. Owen, principal assistant engineer, has been appointed acting chief engineer with offices at Birmingham, Ala.

J. M. Page, division engineer, has been promoted to the position of assistant superintendent of the Pratt No. 1 division of the Tennessee Coal, Iron & R.R. Co.'s coal mines, to succeed William L. Martin, resigned. Mr. Page will be located as heretofore, at Pratt City, Ala.

John S. Critchlow, manager of the Western Fuel Co., of Salt Lake City, has been placed in charge of the Western Pacific Fuel Co., of San Francisco, and will take up his new duties shortly after Apr. 1. The Western Pacific Fuel Co. was recently purchased by the Castle Valley Coal Co., of Salt Lake.

F. D. Underwood, president of the Erie railroad, accompanied by Vice-President Stuart and a party of railroad officials, recently made an extended trip through the coal regions in the vicinity of Scranton, Penn., with the idea of obtaining first-hand information in regard to conditions which at present prevail in this section.

Milnor Roberts, dean of the College of Mines, University of Washington, and Prof. Joseph Daniels, recently accompanied a party of 20 senior and junior students on a trip of mine inspection to Texada Island, B. C. The objects of the trip were to study the deposits of iron, copper, gold and limestone, and to inspect the lime kilns, oil-burning smelters and general mining equipment of the region. Headquarters were established at Van Anda, near the north end of the island.

Chronology of Coal Mining for March

Mar. 7—An explosion of gas in the mine of the Diamond Vale Collieries Co., at Merritt, B. C., killed 7 men and injured two.

Mar. 13—Anthracite operators formally rejected the mine workers' demands.

Mar. 15—Officials of the United Mine Workers refused counter proposition of the anthracite operators.

Mar. 16—An explosion in the Italianka coal mine, Uzovka, Russia, killed 45 men.

Mar. 19—The Interstate Commerce Commission ordered a 10c. reduction in the Pittsburg-Lake freight rate.—Strike in German coal fields ended after conference of miners' leaders.

Mar. 20—Explosion in the Chant No. 2 mine of Sans Bois Coal Co., McCurtain, Okla., killed 74 men.—Conference of bituminous operators and miners opened in Cleveland, Ohio.

Mar. 26—Explosion in the mine of the Jed Coal & Coke Co., Jed, W. Va., killed 81 men.

Mar. 29—Compromise agreement effected between bituminous operators and miners in conference at Cleveland.—Suspension of work in anthracite mines of Pennsylvania was ordered by officials of United Mine Workers.—Bill providing minimum wage for miners became a law in Great Britain.

Construction News

Harlan, Ky.—The Wisconsin Steel Co. will erect another battery of byproduct coke ovens at their local plant during the coming summer.

Ashland, Ky.—William G. Eaton, of Cincinnati, and associates will build 100 byproduct coke ovens, at Ashland. Estimated cost, $1,000,000.

Barbourville, Ky.—The Harlan Coal Co. is installing machinery for manufacturing lumber and will begin work this month on opening its recently acquired coal lands.

Birmingham, Ala.—The Roden Coal Co. will erect 20 miners' dwellings and a new commissary, at the Marvel mine; $20,000 is appropriated for this work. B. F. Roden, Jr., is president.

Uniontown, Penn.—The Superba Coal Co., operating at Evans Station, near here, will make a new opening at its mine and undertake other improvements in order to ship coal on the Pennsylvania R.R. I. W. Buttermore will have charge of the work.

Milwaukee, Wis.—The Pennsylvania Coal & Supply Co. has secured options on 10 acres of land along the water front and will build a coal-storage and transfer dock. The company has recently increased its capitalization from $750,000 to $1,000,000. Jesse B. Whitwall is president.

Birmingham, Ala.—With the completion of the merger of the Woodward Iron Co. and Birmingham Coal & Iron Co. properties, it is expected that the contemplated improvements and developments will go forward. These include the construction of a 400-ton furnace and a battery of byproduct ovens.

Publications Received

REPORT OF INVESTIGATION OF TURTLE MOUNTAIN, FRANK, ALBERTA. By Reginald A. Daly, W. G. Miller and George S. Rice. Memoir No. 27, Canadian Department of Mines. 34 pages. 6¾x10 in., 11 illustrations in text, 19 plates, 2 maps. Government Printing Bureau, Ottawa.

The authors of this report constitute a commission appointed by the Canadian Minister of Mines, to determine whether mining operations in the Turtle Mountain are likely to bring about a landslide, and thus endanger the town of Frank. The commission has also reported on natural conditions likely to produce a slide and has made certain recommendations.

STARTING CURRENTS OF TRANSFORMERS. By Trygve D. Yensen. Bulletin No. 55, Engineering Experiment Station, University of Illinois. 45 pages, 6x9 in., illustrated.

The transformer has come to be regarded as one of the most reliable and simple pieces of electrical apparatus. As new material, however, is utilized to increase its efficiency, new problems arise. One of these problems is the momentary rush of current that occurs upon closing the primary circuit of a transformer. In this bulletin, it is shown that while this starting current for old-type transformers may rise as high as four times full load current, it may rise to more than seven times full load current for the new type with silicon steel cores. The phenomenon is fully explained and illustrated by means of oscillograms.

Industrial Notes

The William J. Oliver Manufacturing Co., Knoxville, Tenn., has received an order for 450 mining cars to be used by the Tennessee Coal, Iron & R.R. Co., at its Edgewater mines. The estimated cost of the cars is $30,000. This is a rush order. The Oliver company some time ago made a reputation on a rush order of cars for the Panama Canal.

The Rock Island Coal Mining Co., of Hartshorne, Okla., announces that having sold the output of its Hartshorne group of mines to the Chicago, Rock Island & Pacific Ry. Co., effective Apr. 1, it feels that the territory served with its Alderson coal will not justify the maintenance of sales forces at Oklahoma City, and Fort Worth, and its sales offices at those points will, therefore, be abandoned on that date. Its Alderson coal will be sold to the McAlester Fuel Co., who will distribute it to the trade.

William L. Rickard and Clifford A. Sloan announce the organization of an advertising company, which will conduct its business under the corporate name of Rickard & Sloan. The offices of the company are located in the Evening Post Building, 20 Vesey St., New York. Particular attention will be given to the planning and management of advertising campaigns for concerns engaged in the manufacture of mechanical and electrical apparatus and accessories. The service of the company will include the writing and placing of advertising in trade and other periodicals, and the production and distribution of bulletins, catalogs and circulars.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The panic prices of last month have been liberally discounted during the week, and the market generally has experienced a sharp recession. The movement is confined almost entirely to contracts, there being little or no demand for coal in the open market. Consumers express entire confidence in the belief that the referendum vote of the miners, upon which the bituminous situation now hinges, will be favorable, and that a general resumption in the soft-coal fields will become effective Monday, Apr. 22. The trade has been further depressed by a heavy selling movement on the part of a large number of dealers, who acquired surplus stocks on speculation, for which they are now seeking purchasers.

In the Eastern markets the trade is practically at a standstill, insofar as new business goes. The milder weather, together with the curtailed production at the mines, has removed the last evidence of the railroad congestion, and good tonnages continue to arrive from districts unaffected by the suspension. Prices on bituminous have slumped freely at all points, but are by no means back to the low level prevailing through the early part of the winter. In anthracite it is believed no great inconvenience will be experienced by the consumers before May 1. There are no supplies in the hands of the wholesale dealers and nothing moving in, while requests for prices are met with the reply that there are no quotations, but the consumers generally are well stocked; shipments so far, this month, have been about equal to one day's run under normal conditions.

The trade in Ohio is busy readjusting itself and making preparations for only a short suspension. Prices have softened considerably, due partially to the feeling that there was plenty of the West Virginia and Kentucky product available. It is thought the suspension will be of sufficient duration to work off the surpluses accumulated in anticipation of the shutdown, and this, together with the shortage in the Northwest, has caused a strong optimistic feeling over the outlook in Ohio. The railroad movement here and in West Virginia is about normal.

Heavy tonnages of Eastern coals were sent into the middle West on speculation, which resulted in the market being overshipped, and the trade is now dull and heavy. No shortage will develop here unless the mines are idle for a month or more.

Boston, Mass.

Bituminous has been generally unsettled since the news of the prospective adjustment of the labor troubles, and a decided reaction has set in against the high prices of the last of March. While it is realized that the output is light for the present, anything like panic prices are liberally discounted, and buyers are simply waiting developments. Many bought from two to three months' supply in anticipation of trouble and they are not interested now except at nearly normal prices. The British situation, too, has so far improved that prices at Baltimore and Hampton Roads have receded considerably, and when the tonnage now engaged is cleared we are likely to see signs of contracting for the usual coastwise market. Something in that line has already been done and there will soon remain only the issue of anthracite to interfere with the orderly course of trade. That we are to have a reasonably active market is almost certain.

All-rail, the stop in mining has enabled the roads to work out of the congestion, and the movement is much improved. A large amount of speculative coal is gradually being absorbed at a rather uneven line of prices, but there are still buyers enough, in urgent need, to furnish a market.

The Southern agencies are out looking to place May coal but there will probably be but small tonnages sold until something like a working basis is reached. It remains to see what will be the base price f.o.b. Hampton Roads and Baltimore, for season shipment. Many of the larger buyers will wait until the market settles down.

With warm weather the public seems to have lost interest in anthracite. The dealers, however, are all short of stocks and are easing the trade as best they can. The recent advances at retail have served their purposes in stopping consumers from putting in next season's supply, and if the suspension is limited to 30 days, the dealers will not be put to such great inconvenience. There is fear that shipments will be very slow when mining is resumed, and that there will be more or less anxiety during the entire summer.

Water freights have further eased off with the chance of anthracite transportation being diverted to soft coal, and the recent slow loading at the Virginia terminals. The old contract year has expired and few charters have been made coastwise on April coal. Large tonnages from Hampton Roads to Boston would not command more than $1.30@1.35, as against $1.50 ten days or so ago. The Reading barge rate on cargoes all bituminous are announced to be $1.20, Philadelphia to Boston.

Coal quotations range about as follows:

Clearfield, f.o.b. Philadelphia	$2.75@3.50
Clearfield, f.o.b. New York	2.85@3.80
Clearfield, *en route*, f.o.b. mine basis	1.25@2.25
Georges Creek, (April shipment) f.o.b. Baltimore	2.70@2.85
Pocahontas, New River, Providence, on cars	5.25@5.75

New York

Trade conditions at this point are unusually dull and quiet, considering the labor troubles in effect at the mines. The market experienced a renewed activity during the latter part of last week, but this was only of short duration, and prices now are at the lowest point they have reached since the panicky conditions in effect just previous to the suspension. Some of the large companies continue to take an optimistic view of the situation, and state that they are well satisfied with the outlook, but if prices are any criterion the prospects for an active trade are anything but encouraging.

The curtailment in production at the mines, together with the milder weather, has definitely relieved the railroad congestion, and the movement of bituminous into New York has been good. Water freights are also easier, due to the release of a large number of transports engaged in the anthracite business. Bituminous prices are hardly quotable as few transactions are being made, but are nominally about $2.90@3.25 f.o.b.

The situation in anthracite is somewhat harder as all arrivals have now ceased and everyone is anxiously awaiting the results of the conference at Philadelphia. The anthracite companies have cleaned up their supplies of egg, nut and steam at circular prices, and there is a particular shortage in the steam grades at the present time. It is believed, however, that there is a great deal of anthracite held on speculation. Should the miners and operators reach an agreement, it is probable that such heavy tonnages will be thrown on the open market that prices will decline sharply. On the other hand, should an agreement not be reached, the speculators will no doubt realize handsome

profits. Current anthracite quotations here, are about as follows:

Broken	$5.25
Egg	5.50
Nut	5.20@5.50
Pea	4.50
Buckwheat	4.00
Rice	3.10@3.50
Barley	2.25@2.50

Philadelphia, Penn.

A little touch of winter early in the week had the effect of spurring retail trade somewhat in this vicinity, but it soon fell off again. One- and two-ton lots are about the way orders are coming in, and the dealers are commencing to get a little anxious about the stocks of coal they have on hand, fearing that matters will be adjusted between the miners and operators, before they are able to work off the stocks they were obliged to pay high prices for. It is not thought, however, that there is likely to be a very prompt settlement of the strike issue, as both sides seem to be determined as to what they desire and are willing to give. Some of the large wholesale operators seem to think that the situation is rather critical. Manufacturing establishments in and around the city are conserving their supplies, and making them go as far as possible.

Of course, as far as the wholesale market is concerned, there is practically nothing moving. The receipts so far this month are about what would be produced in one day of normal mining, and this is mostly coal that has already been mined, but just now coming in. Little or no coal is in stock, and requests for prices are met with the invariable response that no quotations or promises of shipments can be made until mining operations are resumed.

Pittsburg

There is no coal market quotable this week, and the mines are idle pending the result of the referendum vote. Operators expect the agreements to be settled in time to open the mines Monday, Apr. 22. As the operators have no coal to ship, the market would be made by such odd lots as speculators could sell and there does not seem to be enough of this to establish any definite figures, though there is a little slack being sold now and then. As to contracts, operators have not quoted prices yet, since the wage matter is not really settled. The basis will presumably be last season's price of $1.15 for mine-run, plus the advance in the mining rate, but subject to such concessions as may possibly develop. No prices have been named yet on lake coal, but the market will probably open up within a fortnight. The ice has been particularly thick, and no boats are expected to get into Lake Erie ports for loading until about May 5.

Connellsville Coke—The coke market has remained stiff, despite the fact that the wage settlement in the union bituminous districts removes the prospect of there being any demand for raw Connellsville coal; it is a question of supply and demand of coke alone. The furnaces do not seem to have called for suspension of shipments to any extent to use up the stocks accumulated in February and March, and coke is still scarce. The market for spot furnace coke is only a shade easier, at $2.30 to $2.40, and the same is true of spot foundry coke, which runs at $2.75 to $3 according to grade. There has been little contracting done, though one or two second-quarter contracts have been put through at about $2. A number of foundry-coke contracts have been made, at prices running from $2.40 up to $2.65.

The New York State Steel Co. has closed contracts for two lots of furnace coke aggregating 12,000 tons monthly for April, May and June, paying a trifle under $2 for one lot and about $2.10 for the other lot, there being a difference in the quality of the two grades. Based on this fact the absurd report has been in circulation that a sale had been made of 12,000 tons a month for the balance of the year at $2.10, which would be an unreasonable figure. Foundry coke has been in light demand and is a trifle easier. We quote: Prompt furnace, $2.40; prompt foundry, $2.75@3, per ton at ovens.

The *Courier* reports production in the Connellsville and lower Conellsville in the week ending Mar. 30 at 413,141 tons, an increase of 15,000 tons, and shipments at 4678 cars to Pittsburg, 6702 cars to points West and 1070 cars to points East, a total of 12,450 cars, or an increase of 800.

Baltimore, Md.

While prices have by no means dropped to the low level prevailing before the recent activity set in, the figures quoted in the Baltimore market during the past week were considerably below those asked two weeks or even one week ago. In numerous instances the best grades have sold at $2.75 per ton, whereas three or four weeks ago, they brought $3.25@3.35, while the lowest grades are selling at $2 or less. This latter grade, when the demand was at its height in March, brought $2.50@2.75 per ton, and consumers purchased it willingly.

Notwithstanding the settlement of the English strike, there were large shipments of coal made from this port during the week to countries which had been depending on the English mines for their supply. Among these were 5000 tons for South America, shipped by the Hutchinson Coal Co., of Philadelphia, and 5000 tons by the Consolidation Coal Co. destined for Egypt.

Many of the Baltimore companies have renewed contracts for the ensuing year, while others have not yet closed with some of their largest customers. One operator stated that not a few consumers were holding off, believing that contracts could be renewed at lower prices than now prevail. The opinion among operators here is that there will be no strike in the bituminous regions. They feel quite sure that concessions will be made on both sides and that the miners will continue at work.

Buffalo, N. Y.

The coal trade is very dull, with next to no anthracite moving and just enough bituminous to keep the jobber anxious. He has done well as a rule during the late stocking-up season, but now finds that there are miners enough at work to furnish all the coal that is wanted, so the prices are very slack. Some members of the bituminous trade are confident that prices will not drop back to the low level of last season, but others find that they have pretty nearly done so already, certain of the cheaper coals being offered last week as low as 95c. at the mines for mine-run.

As a rule the consumers at points easily reached are well supplied and will not buy at any price, but there are other points that are short, mainly on account of the failure of the railroads to deliver the coal. This is quite often the case at small Canadian towns that are dependent on Buffalo as a supply center. The jobber ought to be in a position to take advantage of such conditions, but the roads are as ready to deliver low-priced coal as any, so that the control of the market is very hard to maintain.

While some bituminous coal is selling at prices all the way up to 50c. over old quotations, there is also some moving at about the former figures, $2.60 for Pittsburg three-quarter, $2.50 for mine-run and $2.25 for slack, with coke also not so strong, but usually commanding a little more than the former $4.50 for best Connellsville foundry.

There is now little uneasiness over the mining situation. No prolonged strike is looked for by anyone, though it is believed that the operators everywhere will resist the chief demand of the miners for a recognition of the union. Quite a good many jobbers have made good profits in bituminous coal, but as a rule the mine owners had too many contracts to fill to make it easy to take advantage of the situation.

There is not much prospect of a supply of anthracite right away. Neither the shipping agents of the large companies nor the sellers of independent anthracite have a supply and nobody is making any effort to fill orders. There is not even any selling on future delivery, so that when the trade is resumed it will be new business.

Columbus, Ohio

Following the announcement that there would not be a suspension of more than 30 days at the most, and probably only three weeks, the coal trade in Ohio has softened considerably from the high quotations paid during the latter part of March. With the settlement of the wage scale and the general good feeling existing between the operators and miners, it is believed that the trade will soon be in a normal condition.

Prices have weakened materially, and they are nearer the figures which prevailed several months before the advance. Another factor which tended to keep down prices recently was the feeling that there was plenty of West Virginia and Kentucky coal on hand. Then, again, most of the steam users succeeded in getting quite a surplus, and there is no one now who would pay very high prices.

Jobbers are playing a waiting game and will be on hand when operations are again resumed. There is practically no demand for the domestic grades, and thus prices are about down to the level which prevailed during the greater part of the winter. The steam grades, of course, are in good demand, but prices are much reduced from the high premiums secured two weeks ago.

Operators are looking forward to a good Lake business, as reports show that little or no coal is being carried over on the docks in the Northwest. With a suspension of several weeks or a month, the surplus on the market will be used up, and this will help to keep quotations up relatively high. There are sufficient stocks in the hands of retailers to fill the small orders which are coming in, and no anxiety is felt on that score. Retailers have a large amount of coal which was held up by the congestion in railroad traffic, and this is now being delivered.

Prices prevailing in Ohio fields are:

Hocking Valley	
Domestic lump	$1.55
¾-in.	1.45
Mine-run	1.15
Nut	1.15
Nut, pea and slack	1.00
Coarse slack	0.80
Pittsburg No. 8	
¾-in.	$1.40
Mine-run	1.15
Coarse slack	1.00
Pomeroy Bend	
Domestic lump	$1.80
¾-in.	1.55
Mine-run	1.25
Nut, pea and slack	1.05
Coarse slack	1.00
Kanawha	
Domestic lump	$1.50
¾-in.	1.25
Mine-run	1.10
Nut, pea and slack	0.90
Coarse slack	0.80

Cleveland, Ohio

The excitement in the strike situation is over, but now comes the enevitable adjustment. Coal was bought at the eleventh hour and the settlement terminated so suddenly that many parties hastily canceled orders, under various excuses. This has caused friction and bad feeling, and naturally so. The situation at this time is practically at a standstill, owing to everyone stocking up in anticipation of a strike, and a good many are dissatisfied that it failed to materialize. However, the precaution was well advised as it was a guess as to the outcome, and it certainly was not expected that a settlement would be arrived at so abruptly.

Hampton Roads, Va.

There has been a decided drop in coal prices at Hampton Roads during the past few days; last Saturday New River and Pocahontas coals were selling at $4@4.25 per ton f.o.b. and even at $4.50, while today the same coals are bringing $3.50@3.75. High volatile coals, considerable tonnage of which was shipped to tidewater lately over the Chesapeake & Ohio and Norfolk & Western Railways, has dropped to $2.50@2.75, with a lessened demand.

Several of the large selling agencies are in bad shape for coal to load on ships already here, or chartered, and there is still a heavy demand for the best grades, as the vessel tonnage here is far in excess of the coal on hand at the piers. The car supply at the mines has been slightly better during the past week and a further improvement is looked for, but the Virginian Ry., which was getting better movement on its cars, has again been blocked by an immense slide just west of Roanoke, Va. During the first four days of the month 68,167 tons were loaded for foreign ports at the two Norfolk coal piers.

It is reported that the Panama Canal contract for coal, on which bids were made last month, and rejected by the Commission, has been given to the Pocahontas Fuel Co., covering all requirements from Apr. 1, 1912, to Oct. 1, 1914, at a price of $2.70 per long ton, f.o.b. Hampton Roads. It is understood that the coal may be shipped from either of the three Hampton Roads piers and that it will be divided up among four or five of the largest shippers at those ports.

Charleston, W. Va.

The transferring of engines and cars from other lines to the West Virginia field, especially along the Chesapeake & Ohio, has assisted greatly in relieving a situation that permitted the mines to operate not over half time. Several thousand cars have been thrown over the C. & O. lines in addition to about a dozen engines.

Not all the mines, however, have profitted by the additional cars. Contrary to expectations about 2000 miners have steadfastly refused to return to work since the first of the month. Some of the large mines along the north side of the Kanawha River have not shipped a ton of coal this month. These are mines at which union men are employed and where the foreign element predominates. The instructions of the union officials have been respected by the Americans and not by the foreigners. The latter allege that heretofore when they entered into an agreement to remain at work, pending a settlement of a wage scale, they have always gotten the worst of it. In one case, it is pointed out, that the operators refused to pay the increase between the time of the expiration of the old contract and the new one, although such an agreement had been made.

The great demand for coal and the high prices prevailing, is making the present shutdown expensive to the operators, who, as a rule, have not been enjoying good prices during the past year or two. The operations at Boomer, owned by the Hanna interests, and the Sunday Creek mines near Boomer, are the heaviest sufferers by the failure of the foreign union men to continue at work.

The output of coal in the Kanawha and New River districts during the month of March was 54,150 tons greater than in February, yet the mines were operated on an average of only 9.8 days, owing to a shortage of cars. The output of the Kanawha, New River and Kentucky districts along the line of the Chesapeake & Ohio was 1,508,090 tons.

Louisville, Ky.

Coal dealers of Louisville, both wholesale and retail, are experiencing considerable difficulty in meeting demands upon them, due to reported lack of car facilities at the mines. The retail dealers are not having as much trouble as the wholesalers, as the warm weather has materially decreased the scope of their business for the present.

Wholesalers who supply commercial plants, office buildings, etc., are being put to considerable trouble. Mine operators lay the slowness in delivery to their inability to get cars. The high waters at present are also interfering seriously with railroad facilities. Many of the Louisville dealers have taken time by the forelock and are fairly well supplied with coal, so much so that frequent requests from other cities have come to them for aid.

Nashville, Tenn.

Since the strike has been settled there is very little activity in the west Kentucky coal fields. The usual dullness in domestic lines incident to the warm weather, combined with the extra storing done the latter part of March, means that few of the operating companies have any business or will have for some time.

Screenings are scarce and cannot be had at any price, owing to the inability of mines to move the larger-size coal.

The operators and miners in the union field of west Kentucky are now attempting to settle their differences, the miners contending for the same basis of settlement that was made in Cleveland, which most of the operators are vigorously opposing on account of the competition which they have in this field with the nonunion mines. There seems to be quite a difference of opinion as to whether or not a settlement can be effected in this district, many believing that it cannot, for quite a while at least.

Indianapolis

As a result of the suspension which went into effect Apr. 1, no bituminous coal will be taken from the mines of this state by union miners, except in case of necessity, and then only by permission of the district officials. The suspension differs from a strike, since the miners readily consent to leave pump men and others at work to protect the mines.

The bituminous miners will be out only long enough for the wage agreement to be ratified by a referendum vote. The tickets for this are now being sent out from the miners' headquarters, and it is confidently believed the agreement will be sanctioned by a large majority. It will take at least two weeks to take the vote and will require additional time to canvas the same, so that the bituminous miners are not expecting to resume work much before May 1.

Operators and miners alike are greatly pleased over a settlement having been reached without a long strike. J. C. Kolsem and P. H. Penna, president and secretary of the Indiana Operators' Association, and W. D. Van Horn and Charles Fox, secretary of the Indiana Mine Workers' Association, all express gratification because an industrial conflict was avoided. It is best for the members of the associations and for the industrial world as well, they assert.

Chicago

With the expectation that mines in the Illinois field will resume operations within a month, Chicago coal dealers are now bending their efforts toward readjusting their business to the decidedly lower scale of prices.

There is absolute quiet in the domestic market and steam users are supplied for a month at least. There was a lot of nonunion coal bought on speculation and these buyers lost heavily as a result of the agreement between the operators and miners. Eastern coals were shipped here at a delivered cost of $3 and the same coal afterward sold at $2 a ton, or less.

The screenings situation has occupied a fairly strong position. Screenings of good grade and fair size have brought $2 to $2.25, Chicago. Coke prices are unchanged.

Prevailing prices at Chicago are:

Sullivan County:	
Domestic lump	$2.62@2.87
Egg	2.50@2.75
Steam lump	2.17
Screenings	1.67@1.82
Springfield:	
Domestic lump	$2.57@2.82
Steam lump	2.17
Mine-run	1.97@2.07
Screenings	1.67@1.82
Clinton:	
Domestic lump	$2.52@2.77
Steam lump	2.17
Mine-run	1.97@2.07
Screenings	1.67@1.77
Pocahontas and New River:	
Mine-run	$3.15
Lump and egg	4.05

Prices asked for coke are: Connellsville and Wise County, $4.85; byproduct, egg and stove, $4.95; byproduct, nut, $4.75; gas house, $5.

Minneapolis—St. Paul

Coal men in the Twin Cities are doing nothing and the trade is practically at a standstill. Men who have been in the coal business for over 20 years say that never before have they seen the time when business was as quiet as it is at the present time. Generally this period of the year is contracting time, but no one seems to have any prices and, although they have numerous inquiries from parties regarding contracts, they are not at liberty to sign up.

Since the Health Department of Minneapolis, especially the smoke inspector, together with the Civic Commerce Commission, has become quite aggressive in seeking to abate the smoke nuisance, representatives of wholesale companies held a conference with Smoke Inspector Allen to know what his attitude was toward coal other than the so called smokeless coals.

The coal men contend, of course, that the coal from other fields should continue to have a fair show in the steam trade in this city and that from the standpoint of efficiency, Illinois, Indiana, Ohio and Pennsylvania bituminous coals could be shown to have many good points in their favor, and the Health Department should not commend or recommend any one coal for use in plants. Mr. Allen, the city smoke inspector, made it clear that it was not the intention to favor any one coal, but that it was a matter of educating the consumers to the installation of automatic stokers and the correct combustion of fuel, all of which would take time to bring about. He asked for the coöperation of the coal trade in bringing about better conditions in the firing of coal in order to minimize the present nuisance from excessive smoke.

The retail coal business in both cities has been exceptionally dull during the past week as the weather has been very mild.

St. Louis, Mo.

There is very little doing in the St. Louis coal market. As a matter of fact, it is at a standstill, although, on good authority, it is understood there will be no shortage of coal in St. Louis if the mines remain idle for four weeks. There are several hundred cars of coal on track on the east side of the river and at the mines on the railroads owned by coal-producing companies, and there is very little outside coal coming in.

A few cars of smokeless are straggling in, but there is nothing in the way of anthracite, and Kentucky coal is practically a thing of the past, unless something unforeseen comes up. However, there is still a few cars of Kentucky coal coming in on contract, but the bulk of that coming to St. Louis has been disposed of by a Tennessee selling agency in Chicago; this amounted to 10,000 tons.

There is no shortage in this market and probably will not be, as everything indicates that the miners will vote for acceptance of the terms as submitted to them by their representatives and the operators. The mines will probably resume work between Apr. 20 and the first of next month.

A Chicago coal man, with a mine in Franklin County, and a St. Louis office, offered to build a half mile of railroad at East St. Louis, connecting the L. & N. with the I. C., if the railroad would furnish the steel, in order to get the L. & N. to allow their equipment to go to Chicago. The L. & N. turned the proposition down flatly, unless they were guaranteed an empty coal car in return for every load they delivered the I. C., the same to be delivered on the same day. It was impossible to make the guarantee, and consequently the coal was sacrificed on the St. Louis market, and helped further to depress prices.

Portland, Ore.

Coal dealers are not at all optimistic over the outlook here, one of the chief reasons being the extensive introduction of oil. In a great many instances oil is supplanting coal here and throughout the state at steam plants. But with the opening of the Panama Canal, it is expected there will be a good demand for coal, as the great majority of vessels engaged in the coast to coast trade will probably be coal burners. The steamers in the coastwise trade are now burning chiefly oil.

The demand for coal has been very light here this winter, and there is some complaint coming from the old dealers to the effect that much inferior coal has found its way on the market. Storage prices will probably not be made effective for a couple of months yet, although the

weather is already summerlike here. It is expected that the Eastern coal strike may have some effect on the Wyoming coals, and, if this should prove true, local dealers will have an opportunity to gain some of the profit they had in view last winter, which failed to materialize because of the mild weather.

A great deal of interest is taken in the Alaskan coal fields, and if they are thrown open to development and cheaper coal made available, manufacturing will be given a strong impetus. For the present the freight is preventing coal from meeting with the demand here that dealers would like to see.

San Francisco

Imports by sea during the past week comprise 9462 tons of British Columbia, and one cargo, 5160 tons, of Pocahontas, the latter consigned to the United States government for navy uses. Car shipments from the Rocky Mountains were normal; the demand for this coal keeps good, and had it not been for the accumulated stocks in dealers' yards, due to the mild winter, receipts would doubtless have been much heavier.

The Western Fuel Co., a San Francisco corporation, owning large collieries in British Columbia, has been for some time past the dominant factor in this market, so far as British Columbia and Australian coal is concerned. Recently this company absorbed the coal business of a local firm, which was a direct importer and distributor of Australian, and now, as a matter of fact, it has no competitor in either this or the British Columbia product.

While, as previously stated, no accurate data are obtainable as to the quantity of Rocky Mountain coal coming into this state, there can be no question but that it is gaining in favor and securing a strong foothold in the domestic trade; the quality is well liked on account of its cleanliness, and the lower freight rates have enabled the colliery owners to land it here at reasonable prices.

Current prices to dealers are as follows, per ton:

Wellington (British Columbia)	$8.00
Pelau Main (Australian)	8.00
Rocky Mountain	8.50
Cumberland	12.50
Anthracite (Pennsylvania)	15.00

Production and Transportation Statistics

Baltimore Exports

For the period of three months; that is, January, February and March, 149,320 tons of coal were exported from Baltimore to consumers in 11 different countries. February tonnage was heavy, 41,129 tons having been shipped from this port during that month, but the demand was the heaviest during March, when 83,536 tons were loaded here for foreign ports. In January, the tonnage was light, totaling 24,655 tons, as in that month, the strike in England had not yet begun.

Exports

Total exports of anthracite during January, 1912, were 221,854 tons, as compared with 251,737 for the same month last year. Bituminous exports for January, 1912, exclusive of bunker coal, were 667,263 tons, as compared with 740,974 tons for January, 1911. Bunker or fuel coal laden on vessels in the foreign trade amounted to 552,965 tons in January, 1912, as compared with 481,874 tons for same month last year. Exports of coke for January, 1912, were 53,114 tons as compared with 87,578 tons in January, 1911.

Alaska

Shipments of coal to Alaska for January, 1912, were 523 tons as compared with 1107 tons in January, 1911.

Porto Rico

Anthracite shipments to Porto Rico for January, 1911 and 1912, were 1695 and 305 tons respectively. Bituminous shipments for the same months were 8203 and 2233 tons respectively.

Domestic Coastwise Movement

The following is a comparative statement of domestic coal shipments from the five principal Atlantic ports for January, 1911-12, in long tons:

	1911	1912
New York	2,355,276	2,337,474
Philadelphia	555,723	436,361
Baltimore	422,840	265,050
Newport News	244,022	212,194
Norfolk	285,880	389,781
Total	3,863,741	3,640,860

Pennsylvania Railroad

The following is a comparative statement of coal and coke carried on the P. R.R. Co.'s lines east of Pittsburg and Erie for the first two months of 1911-12, in short tons:

	1912	1911
Anthracite	2,147,761	1,938,093
Bituminous	7,668,282	6,594,638
Coke	1,964,184	1,683,771
Total	11,780,227	10,216,002

Anthracite Shipments

March	1912	1911	Changes
Phila. & Read.	1,472,696	1,057,279	+115,427
Lehigh Valley	1,225,019	1,086,529	+138,490
Cen. R.R. of N. J.	848,110	768,031	+180,079
Del., Lack. & W.	916,824	738,499	+178,325
Del. & Hudson	578,983	698,443	—119,460
Penn. R.R.	537,470	586,016	— 48,546
Erie	761,742	811,357	— 49,615
Ont. & West	288,843	250,740	— 21,897
Total	6,596,687	5,996,894	+572,793

Production of coal in the first three months of 1912 was 18,209,351 tons, as compared with 16,971,959 tons in 1911, an increase of 1,237,392 tons. These are the heaviest shipments in the quarter of any year.

The Car Situation

The releasing of a number of cars by the more favorable weather resulted in a big increase in the latest idle car statement, for the period ended on Mar. 27. Two weeks earlier the shortages reported in various parts of the country almost resulted in wiping out the net surplus, and the total number of cars reported on that date, which was 3042, was the smallest in years.

The exceptional record which has been made in recent weeks in this line was also explainable in part to the unusual activity of coal shippers who were preparing for the expected strike by getting as much coal on the markets as possible. Two weeks ago there were shortages both in coal and box cars.

There was a total surplus on Mar. 27 of 52,682 cars, shortages in other districts bringing down the net surplus. This indicates the difficulty the companies have experienced in effecting a proper distribution of their free equipment.

Financial Notes

The annual report of the Island Creek Coal Co. for the 1911 calendar year shows net profits of $531,612, equivalent to $2.34 on the 99,568 common shares after payment of preferred dividends.

The annual report of the Delaware & Hudson Co. for the year ended on Dec. 31 shows a surplus of $5,237,000, which is equivalent to 12.32% on the $42,503,000 of stock outstanding. Last year the company earned 12.54%. It is paying annual dividends of 9%.

The listing committee of the New York Curb Market Association has approved the application of the Lehigh Valley Coal Sales Co. to list the outstanding 121,216 shares of the common stock, par value $50 full paid. The total amount authorized is $10,000,000. The Bankers' Trust Co. is registrar for the stock and the transfer agency is located at 90 West Street.

Steel conditions in Canada being largely in sympathy with those in this country, earnings of the Nova Scotia Steel & Coal Co. for the 1911 fiscal term ended Dec. 31, amounting to $1,019,392, exhibited a loss of $121,112 from those of 1910, although they were larger than the figures of 1909. The balance after all charges was $450,342, or $65,853 less than the previous year, while the surplus after preferred dividends of $367,942 was equivalent to 6.13% on the $6,000,000 common stock as against 7.23% in 1910. As 6% was paid on these shares, the net surplus for the year was only $7942, compared with $163,795 the season before.

Another appeal is to be made to the stockholders of the Bon Air Coal & Iron Co. to accept the plan of reorganization suggested last September by the committee composed of Joseph H. Thompson, Maj. E. B. Stahlman and Byrd Douglas. A letter is being sent out by the committee composed of Judge J. M. Dickinson, P. D. Maddin and Edgar Jones, calling attention to the condition of the company. It is stated that for seven months of 1910 the net earnings of the company under operation by the receiver amounted to $62,226, and that for 1911 the net earnings were $47,589, though 1911 was one of the hardest years of history for the iron industry.